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RESEARCH ARTICLE

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Taxonomic revision of the mydas-fly genera *Eremohaplomydas* Bequaert, 1959, *Haplomydas* Bezzi, 1924, and *Lachnocorynus* Hesse, 1969 (Insecta, Diptera, Mydidae)

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Abstract

The genera *Eremohaplomydas* Bequaert, 1959, *Haplomydas* Bezzi, 1924, and *Lachnocorynus* Hesse, 1969 (Diptera: Mydidae: Syllegomydinae) are revised. Currently, four species are known from southern Africa, *i.e.*, *Eremohaplomydas desertorum* Bequaert, 1959 from north-western Namibia, *Haplomydas crassipes* Bezzi, 1924 widespread in southern Africa, *Lachnocorynus chobeensis* Hesse, 1969 from northern Botswana, and *Lachnocorynus kochi* Hesse, 1969 from northern Namibia. Four new species, *Eremohaplomydas gobabebensis* **sp. nov.** and *Eremohaplomydas whartoni* **sp. nov.** from the central Namib desert of Namibia, *Eremohaplomydas stomachoris* **sp. nov.** from the northern Namib desert in Namibia, and *Lachnocorynus stenocephalus* **sp. nov.** from north-eastern Zimbabwe are described. *Lachnocorynus kochi* is synonymized with *Lachnocorynus chobeensis*. Distribution, biology, occurrence in biodiversity hotspots *sensu* Conservation International and seasonal imago flight activity are discussed. Descriptions/redescriptions, photographs, specimen occurrence data, and identification keys (both dichotomous and matrix-based) to species are provided and made openly accessible in data repositories to support and accelerate future studies of the included taxa. An updated identification key to the Mydidae genera of the Afrotropical Region is provided. The placement of the three genera in the subfamily taxon Syllegomydinae is discussed and several morphological features, such as an extremely reduced proboscis in some species, a unique wing venation in *Eremohaplomydas gobabebensis* **sp. nov.**, and the unique metathoracic coxa, are discussed.

Keywords

Afrotropical, cybertaxonomy, Karoo, Mydas flies, Namib Desert, open-access

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Introduction

The Mydidae fauna of southern Africa is the most diverse and richest in the world with 179 (37%) of 480 species world-wide occurring in this region south of the Kunene and Zambesi rivers (Botswana, Mozambique, Namibia, South Africa, and Zimbabwe; no records exist for Eswatini (Swaziland) and Lesotho) alone (Hesse 1969; Dikow 2017). At the generic level, this diversity is similarly striking as 20 of the 38 genera in the Afrotropics, of the 66 genera in the world, are endemic to southern Africa. This revision aims to review the three small and rarely collected southern African endemic genera *Eremohaplomydas* Bequaert, 1959, *Haplomydas* Bezzi, 1924, and *Lachnocorynus* Hesse, 1969 and describe four new species.

This study was instigated by the discovery of yet undescribed species of *Eremohaplomydas* from Namibia, including the discovery of a species by Wharton (1982), and *Lachnocorynus* from Zimbabwe in several natural history collections and by the collection of an undescribed species of *Eremohaplomydas* in Namibia in 2018 (Figs 1–3).

The three genera *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* are here revised together as they share a number of morphological features that could provide evidence for a close phylogenetic relationship. Most strikingly, all three genera exhibit a distinctly clubbed metathoracic femur (Figs 20, 36, 42), the metathoracic tibia is arched medially and a distinct ventral keel is developed (Fig. 20), the metathoracic coxa and the metakatepisternum are developed in a unique fashion that allows the metathoracic leg to be moved laterally (Figs 53–55), and wing cell r_5 is open (Fig. 40).

The taxonomic history of the three genera can be summarized as follows:

Bezzi (1924) described the genus *Haplomydas* with its type species *Haplomydas crassipes* Bezzi, 1924 from Bulawayo in south-western Zimbabwe.

Brunetti (1929) described *Rhopalia flavomarginata* Brunetti, 1929 from Matopos south of Bulawayo in Zimbabwe.

Séguy (1929) described the genus *Heleomydas* with its type species *Heleomydas lesnei* Séguy, 1929 from Nova Chupanga on the banks of the Zambesi River in central Mozambique.

Bequaert (1959) described the genus *Eremohaplomydas* with its type species *Eremohaplomydas desertorum* Bequaert, 1959 from the Namib Desert in north-western Namibia.

Bequaert (1963) synonymized *Rhopalia flavomarginata* with *Haplomydas crassipes* as well as *Heleomydas* with *Haplomydas* resulting in the synonymy of *Heleomydas lesnei* with *Haplomydas crassipes*.

Hesse (1969) described the genus *Lachnocorynus* with its type species *Lachnocorynus chobeensis* Hesse, 1969 from the Chobe River at Kabulabula in northern-most Botswana and *Lachnocorynus kochi* Hesse, 1969 from Oshikango in northern-most Namibia. He furthermore provided a key to all southern African Mydidae genera.

Bowden (1980) catalogued the following species: *Haplomydas crassipes* with both *Rhopalia flavomarginata* and *Heleomydas lesnei* as junior synonyms, *Eremohaplomydas desertorum*, *Lachnocorynus chobeensis*, and *Lachnocorynus kochi*.

Wharton (1982) reviewed the Mydidae species of the central Namib Desert, Namibia and recorded an undescribed species of *Eremohaplomydas* active on the gravel plains in May and provided some biological information on this species.

Dikow (2017) provided a review of the Afrotropical Mydidae with an updated key to the genera including *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus*.

At the commencement of this study the three genera included here were, therefore, known from four species: *E. desertorum*, *H. crassipes*, *L. chobeensis*, and *L. kochi*.

Materials and methods

Morphological features were examined using an Olympus SZ60 and a Zeiss SteREO Discovery.V12 stereo microscopes. Wing length is measured from the tegula to the distal tip of the wing. The female and male terminalia were first excised and macerated in 10% potassium hydroxide (KOH) at 55 °C followed by neutralization in acetic acid (glacial, CH_3COOH) and rinsing in distilled water (H_2O). They were temporarily stored in 75% ethanol (C_2H_5OH) for examination and photography and eventually sealed in polyethylene vials containing 100% glycerine (C_3H_8O) and attached to the specimen's pin.

Terminology

Terminology follows Dikow (2009), Cumming and Wood (2017), and Dikow (2017, general morphology and abbreviations for setae), Stuckenberg (1999, antennae), and Wootton and Ennos (1989, wing venation). Setae are abbreviated as follows: **dc** = discal setae, **acr** = acrostichal setae, **npl** = notopleural setae, **spal** = supra-alar setae, **pal** = post-alar setae. Abdominal tergites are abbreviated in the descriptions with 'T', and sternites

Figures 1–2. Habitat photographs where *Eremohaplomydas gobabebensis* sp. nov. was observed and collected: **1** sparsely vegetated small sand dune West of Kuiseb riverbed at Gobabeb, Namibia (23°33'50"S, 015°01'59"E, note grass *Centropodia glauca* in foreground), taken on 23 Nov 2018 (Zenodo https://doi.org/10.5281/zenodo.6263467) **2** margin of dry Kuiseb riverbed, 20 km NW on D1983 of Gobabeb, Namibia (23°24'56"S, 014°54'43"E, note grass *Cladoraphis spinosa* in foreground), taken on 24 Nov 2018 (https://doi.org/10.5281/zenodo.6263266). Photographs by T. Dikow.

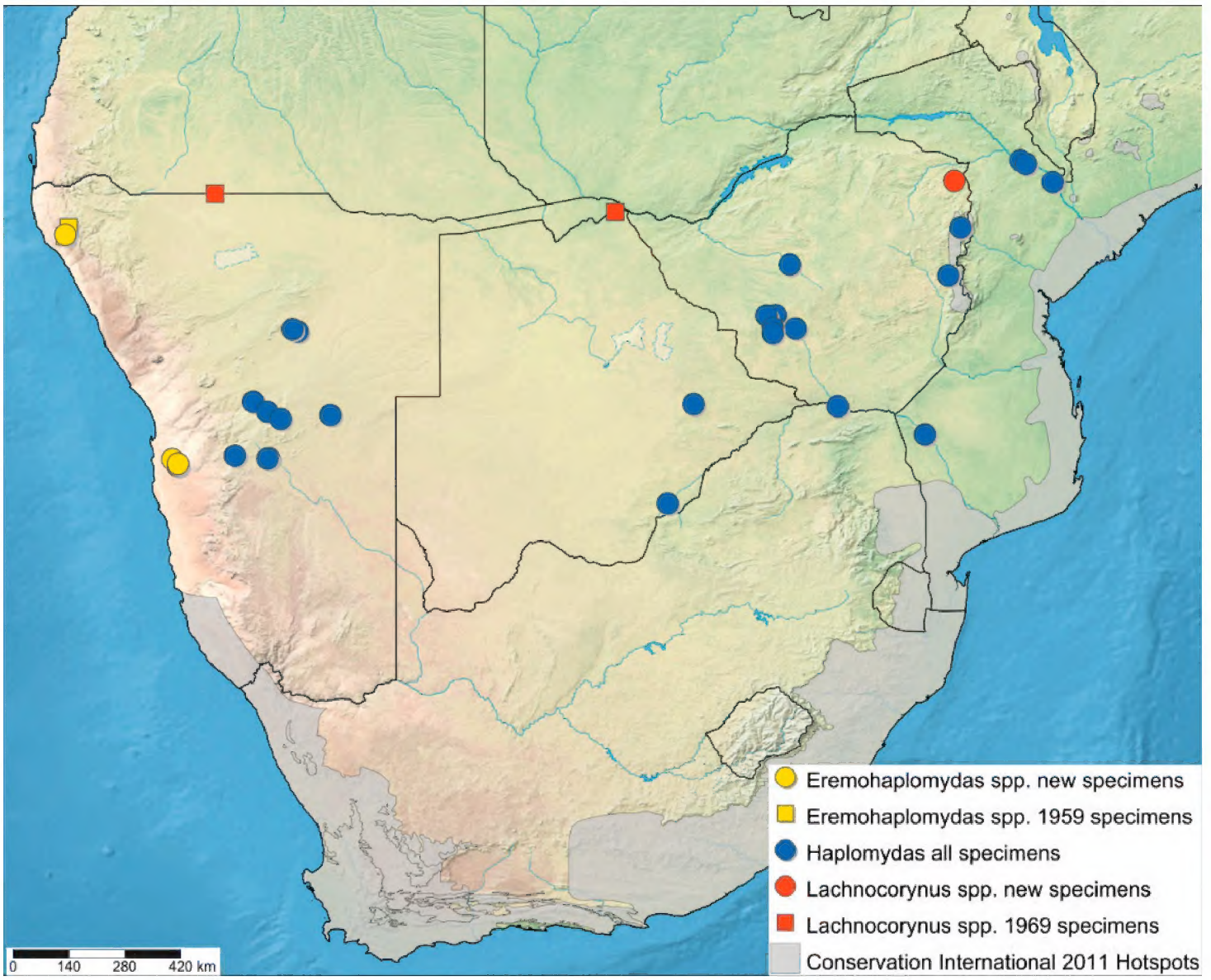

Eremohaplomydas spp. new specimens
Eremohaplomydas spp. 1959 specimens
Haplomydas all specimens
Lachnocorynus spp. new specimens
Lachnocorynus spp. 1969 specimens
Conservation International 2011 Hotspots
0 140 280 420 km

Figure 3. Map of southern Africa with elevational relief and biodiversity hotspots (*sensu* Conservation International in grey) and distribution of *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* specimens studied in respective most recent review and now (SimpleMappr https://www.simplemappr.net/map/14084). Distribution and occurrence data available in Google Earth KML file https://www.simplemappr.net/map/14084.kml and also through GBIF (data-set https://www.gbif.org/dataset/993875DD-5915-4107-8707-835D5A8D1022, DOI https://doi.org/10.15468/awpjz9).

are abbreviated with 'S'. The terms prothoracic, mesothoracic, and metathoracic are abbreviated 'pro', 'mes', and 'met', respectively. The term pubescence (adjective pubescent) refers to the short, fine microtrichia densely covering certain body parts. Other generalized terms follow the Torre-Bueno Glossary of Entomology (Nichols 1989).

Species descriptions and re-descriptions

Species descriptions are based on composites of all specimens and not exclusively on the holotype and are compiled from a character matrix of 196 features and 496 character states assembled with Lucid Builder (version 4.0.10) and eventually exported as natural-language descriptions. These species descriptions have been deposited in the Zenodo data depository and can be accessed in XML-format following the SDD (Structure of Descriptive Data) standard. All taxon names have been registered in ZooBank (Pyle and Michel 2008). If available, permanent URLs or Digital Object Identifiers (**DOIs**) to the original species

descriptions on the Biodiversity Heritage Library (**BHL**, www.biodiversitylibrary.org) or other online sources are provided. The species record for each species at the Global Biodiversity Information Facility (**GBIF**, www.gbif.org) provides a summary of occurrence data, images, or taxonomic treatments from natural history collections. Some previous taxon descriptions have been marked-up in TaxonX XML language (Catapano 2010) and uploaded to the Plazi TreatmentBank (http://plazi.org/treatmentbank/) from where they are accessible in human- and machine-readable formats and a permanent URL provided.

Specimen occurrence data

The following data on species occurrences are given (where available): country, state/province, county, locality, geographic co-ordinates (formatted in both degrees minutes seconds and decimal latitude/longitude for type localities), elevation (in meters), date of collection (format: yyyy-mm-dd), time of day at collection, habitat information, sampling protocol (if other than hand netting), collector, catalog number (a unique specimen identifier and any other identifying number), depository (institution code), number of specimens, sex, life stage, name of person who identified the specimen, and any other previous identifications. Each specimen is listed with a unique specimen identifier (either an institutional catalog number or an AAM-XXXXXX number used by the junior author) that will allow the re-investigation as well as provide a unique Life Science Identifier (**LSID**). The occurrence of all species is illustrated in distribution maps plotted with SimpleMappr (http://www.simplemappr.net; Shorthouse 2010) with all of those localities for which co-ordinates are available or could be gathered from online gazetteers or Google Earth. Type localities are plotted with a square symbol while all other specimens are plotted with a circular symbol. The distribution maps include Biodiversity Hotspots *sensu* Conservation International (Mittermeier et al. 1998; Myers et al. 2000; Mittermeier et al. 2005). The specimen occurrence data are deposited as a Darwin Core Archive (**DwC-A**) at GBIF using the Integrated Publishing Toolkit (**IPT**) at the NMNH. Annual rainfall and temperature averages for geographically restricted species were obtained from either World Weather Information Service (https://worldweather.wmo.int) or World Weather Online (www.worldweatheronline.com).

Photographs and illustrations

Whole habitus photographs of pinned specimens were taken with a GIGAmacro Magnify^2 system, a Canon EOS D5 Mark IV full-frame DSLR, a Canon MP-E 65 mm f2.8 macro-lens, and illuminated by a twin-flash. Some whole habitus photographs were taken using a Visionary Digital Passport II system (base and StackShot only), an Olympus OM-D E-M5 Micro 4/3 camera, a 60 mm f2.8 macro lens (equivalent to 120 mm focal length in 35 mm photography), and illuminated with a Falcon FLDM-i200 LED dome-light for even and soft light. Photographs of the female and male terminalia were taken on a Zeiss SteREO Discovery.V12 stereo microscope with a PlanApo S 1.0× lens at 50–75× magnification and an attached Olympus OM-D E-M1 MicroFourThirds digital camera. The dissected terminalia were placed in 75%

ethanol in a glass dish and illuminated by a Schott VisiLED light source utilizing mixed bright-field (dorsal), dark-field (lateral), and transillumination (ventral). The MicroFourThirds camera was tethered to a laptop and controlled by Olympus Capture software (version 2.2.1) and the vertical movement for obtaining photographs for later image stacking was done manually using the fine drive. Individual RAW-format images were stacked using HeliconFocus Pro (version 7.+) and exported in Adobe DNG-format. All photographs have been deposited in full-resolution in both tif-format and RAW dng-format at Zenodo in the Biodiversity Literature Repository (BLR, http://zenodo.org/communities/biosyslit) community and the individual photo and specimen DOIs are included in the figure captions for access and downloading.

Keys

The online, interactive dichotomous key and the multi-access, matrix-based key have been built with Lucid Builder (version 4.0.10) and both can be accessed on Lucidcentral and the junior author's research web-site.

Institutions providing specimens

Institutions providing specimens are listed below, together with the abbreviations used in the text when citing depositories (institutionCode), a link to the record in the Global Registry of Scientific Collections (**GRSciColl**, https://www.gbif.org/grscicoll), and the people who kindly assisted (some no longer working at these institutions):

AMGS Albany Museum, Grahamstown, Eastern Cape, South Africa (S. Gess, F. Gess) https://www.gbif.org/grscicoll/institution/8F04EE40-D146-4B05-82B2-E31D08381EB4;

AMNH American Museum of Natural History, New York City, New York, USA (D. Grimaldi) https://www.gbif.org/grscicoll/institution/DC02E848-9E1F-4DD0-8078-2EB60620D39B;

BMSA National Museum, Bloemfontein, Free State, South Africa (A. Kirk-Spriggs, B. Muller) https://www.gbif.org/grscicoll/institution/55BD4595-00F6-448A-BD54-34B16A40412B;

CAS California Academy of Sciences, San Francisco, California, USA (N. Penny, M. Trautwein) http://biocol.org/urn:lsid:biocol.org:col:15690;

CSCA California State Collection of Arthropods, Sacramento, California, USA (M. Hauser) https://www.gbif.org/grscicoll/institution/E4829E9C-D657-4AC0-B26E-D659AD09D4CB;

MNHN Museum national d'Histoire naturelle, Paris, France (C. Daugeron, E. Delfosse) https://www.gbif.org/grscicoll/institution/CC3E1F45-E430-4835-951E-4DD33C4B7201;

MZLU Museum of Zoology, Lund University, Lund, Sweden (R. Danielsson) https://www.gbif.org/grscicoll/institution/13EDC77B-7023-4DDD-89C7-D883A480B294;

NHMUK The Natural History Museum, London, UK (E. McAlister) https://www.gbif.org/grscicoll/institution/1D808A7C-1F9E-4379-9616-EDB749ECF10E;

NHMW Naturhistorisches Museum, Wien, Austria (P. Sehnal) https://www.gbif.org/grscicoll/institution/08EA694E-0C7F-446F-B1C2-BB7B1ED6FBAC;

NMBZ Natural History Museum of Zimbabwe, Bulawayo, Bulawayo, Zimbabwe (D. Madamba) https://www.gbif.org/grscicoll/institution/EC9F47D3-BCB0-4262-96DB-6F2AC529872B;

NMNW National Museum of Namibia, Windhoek, Khomas, Namibia (F. Becker) https://www.gbif.org/grscicoll/institution/827515F9-6AB3-4ED9-B825-7AFD7181BEA7;

NMSA KwaZulu-Natal Museum, Pietermaritzburg, KwaZulu-Natal, South Africa (B. Muller, T. Pillay, K. Williams) https://www.gbif.org/grscicoll/institution/F7612BDF-65B0-4B26-A734-7494A5E6CE85;

RBINS Royal Belgian Institute of Natural Sciences, Brussels, Belgium (P. Grootaert) https://www.gbif.org/grscicoll/institution/C2BFDEEF-9C03-435E-8465-C483DADD6995;

SAMC Iziko South African Museum, Cape Town, Western Cape, South Africa (M. Cochrane) https://www.gbif.org/grscicoll/institution/ACE2B65E-D36F-4727-84D5-6FFE047C4BF2;

SANC South African National Collection of Insects, Pretoria, Gauteng, South Africa (R. Urban) https://www.gbif.org/grscicoll/institution/C1681A5E-61EA-491A-9340-910F76546022;

SDEI Senckenberg Deutsches Entomologisches Institut, Müncheberg, Brandenburg, Germany (F. Menzel) https://www.gbif.org/grscicoll/institution/2796E2F5-C160-4E3C-942F-D6D64AB8465F;

SNSB-ZSM Zoologische Staatssammlung, München, Bayern, Germany (M. Kotrba) http://grscicoll.org/institution/zoologische-staatssammlung;

USNM United States National Museum, Smithsonian Institution, Washington, DC, USA https://www.gbif.org/grscicoll/institution/586ee56e-b0fe-4dff-b7f9-aeb104f3308a.

Data resources

GBIF: specimen occurrence data-set – http://www.gbif.org/dataset/993875DD-5915-4107-8707-835D5A8D1022 – DOI https://doi.org/10.15468/awpjz9.

Lucid Builder: illustrated, multi-entry, matrix-based identification key – http://keys.lucidcentral.org/keys/v4/eremohaplomydas-matrix (archived in SDD format at Zenodo – DOI https://doi.org/10.5281/zenodo.6320960).

Lucid Builder: illustrated, dichotomous, pathway identification key – https://keys.lucidcentral.org/keys/v4/eremohaplomydas-dichotomous (archived in SDD format at Zenodo – DOI https://doi.org/10.5281/zenodo.6320934).

Lucid Builder: illustrated, dichotomous, pathway identification key to Afrotropical Mydidae genera v2 – https://keys.lucidcentral.org/keys/v4/Afrotropical-Mydidae-genera-dichotomous (archived in SDD format at Zenodo – DOI https://doi.org/10.5281/zenodo.5295621).
Plazi TreatmentBank taxon treatments:
Bequaert 1959 – http://tb.plazi.org/GgServer/summary/FFEFFFD55963FFF0FFE3FFE9FFBEFFB3

SimpleMappr: distribution maps – https://www.simplemappr.net/map/14084?width=1000&height=750&legend=true (as in Fig. 3; Google Earth KML file http://www.simplemappr.net/map/14084.kml); https://www.simplemappr.net/map/14089?width=1000&height=750&legend=true (as in Fig. 56; Google Earth KML file http://www.simplemappr.net/map/14089.kml); https://www.simplemappr.net/map/14090?width=1000&height=750&legend=true (as in Fig. 57; Google Earth KML file http://www.simplemappr.net/map/14090.kml).

Zenodo: natural-language species descriptions from Lucid Builder 4.0 in SDD format – DOI https://doi.org/10.5281/zenodo.5139987.

Zenodo BLR: full-resolution specimen photographs – DOI https://doi.org/10.5281/zenodo.6115471.

ZooBank new nomenclatorial acts: http://zoobank.org/F849C700-225A-4923-AE19-62882F933E83.

Taxonomy

***Eremohaplomydas* Bequaert, 1959**
http://zoobank.org/F170BC4E-DC90-4903-8836-53E3B693CB13
GBIF https://www.gbif.org/species/1591415
Plazi TreatmentBank http://treatment.plazi.org/id/03D687AD-5962-FFF1-FDA9-FB4AF93AF63F

Eremohaplomydas Bequaert, 1959: 357. Type-species: *Eremohaplomydas desertorum* Bequaert, 1959, by monotypy.

Diagnosis. The genus can be delineated by the very small to minute proboscis, the costal vein terminating at the point where R_1 joins the wing margin, the small body size of the majority of species, and the restricted distribution in the Namib Desert.

Distribution, biodiversity hotspots, phenology, and biology. Known only from five disjunct localities in the northern and central Namib Desert in Namibia (Figs 56–57) to which the genus is endemic. A rarely collected genus known only from 18 specimens in museum collections from nine collecting events between 1951–2018 (Table 1). The genus is not known to occur in any currently recognized biodiversity hotspot. Adult flies are either active in early summer or mid-autumn to early winter (Table 2). Nothing is known of the biology.

Table 1. Collecting event summary for *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* species.

Species	# specimens	#♀/#♂	# collecting events	earliest collection	most recent collection	iNaturalist observation
E. desertorum	3	1/2	2	1951	1951	–
E. gobabebensis sp. nov.	7	0/7	3	2018	2018	–
E. stomachoris sp. nov.	1	1/0	1	1970	1970	–
E. whartoni sp. nov.	7	2/5	4	1979	1979	–
summary	18	4/14	9	1951	2018	
L. chobeensis	4	1/3	3	1930	1948	2019
L. stenocephalus sp. nov.	1	0/1	1	1986	1986	–
summary	4	1/3	3	1930	1986	2019
H. crassipes	67	22/44	25	1917	1999	–
summary total	89	27/60	37	1917	2018	2019

Table 2. Seasonal imago flight activity of *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* species through number of specimens collected and unique collecting events in each month (data given as # specimens/# collecting events). Months abbreviated starting with July. * = iNaturalist observation.

species	Jul	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
E. desertorum	-	-	-	-	-	-	-	-	-	-	-	3/2
E. gobabebensis sp. nov.	-	-	-	-	7/3	-	-	-	-	-	-	-
E. whartoni sp. nov.	-	-	-	-	-	-	-	-	-	-	7/4	-
E. stomachoris sp. nov.	-	-	-	-	-	-	-	-	-	-	1/1	-
L. chobeensis	3/2	-	-	-	-	-	-	-	-	-	-	1/1*
L. stenocephalus sp. nov.	-	1/1	-	-	-	-	-	-	-	-	-	-
H. crassipes	-	-	-	-	-	-	-	3/1	19/9	35/9	7/7	-
total	3/2	1/1	-	-	7/3	-	-	3/1	19/9	35/9	15/10	4/3

***Eremohaplomydas desertorum* Bequaert, 1959**

http://zoobank.org/DD434890-73C0-429E-AE09-670889346232

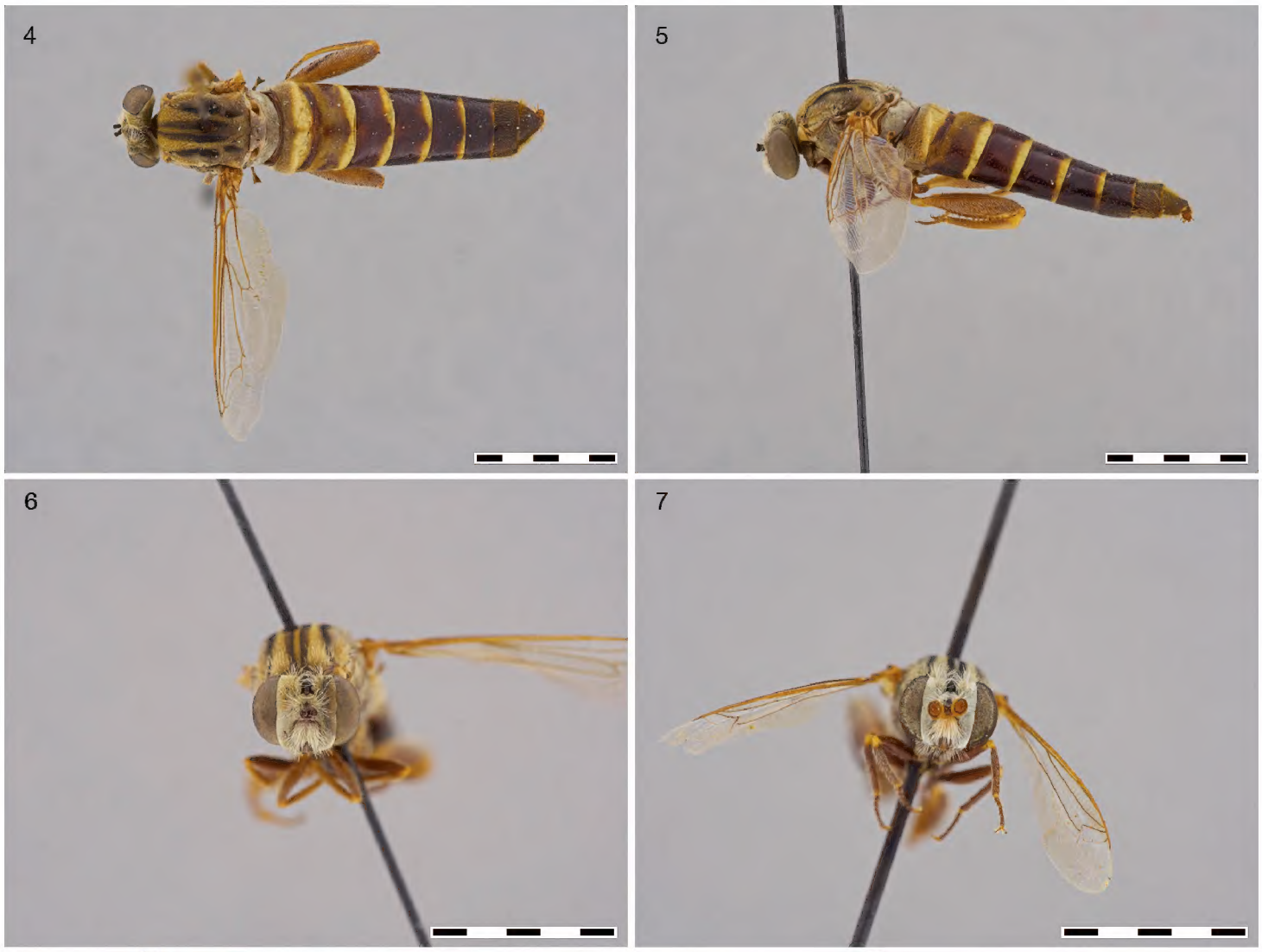
GBIF https://www.gbif.org/species/1591416

Plazi TreatmentBank http://treatment.plazi.org/id/03D687AD-5962-FFF7-FFD5-F63AFEF3F788

Figs 4–9, 56

Diagnosis. The species is distinguished from congeners by the overall brown colouration, the greatly expanded metathoracic femora, the apubescent abdominal tergites 3–8 in females, and the restricted distribution in the northern Namib Desert.

Description. Female. ***Head*:** black, facial gibbosity brown, in general grey to light brown pubescent, white setose, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex same as at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin, vertex light brown pubescent, white setose; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, white; parafacial area approximately as wide as ¾ width of central gibbosity (at same level); frons not elevated, light brown pubescent, white setose; occiput grey pubescent, yellowish to light brown setose, median



Figures 4–9. *Eremohaplomydas desertorum*: **4** ♀ holotype (MZLU-2143:1, Zenodo https://doi.org/10.5281/zenodo.6083924), dorsal (https://doi.org/10.5281/zenodo.6083955) **5** same, lateral (https://doi.org/10.5281/zenodo.6083957) **6** same, head anterior (https://doi.org/10.5281/zenodo.6083959) **7** ♂ paratype (MZLU-2143:2, https://doi.org/10.5281/zenodo.6083926), head anterior (https://doi.org/10.5281/zenodo.6083965) **8** same, dorsal (https://doi.org/10.5281/zenodo.6083961) **9** same, lateral (https://doi.org/10.5281/zenodo.6083963). Scale bars: 5 mm.

occipital sclerite yellowish macrosetose; pocl macrosetae absent; postgena sparsely grey pubescent, long, sparsely white setose; clypeus comprised of single sclerite, entirely sclerotized medially, flat to protruding (convex) ventrally, ventrally expanded, anterior to proboscis (almost covering it), laterally connected to face by sclerotized cuticle; proboscis very short, vestigial, knob-like, brown; labellum indiscernible,

length indiscernible, sclerotization indiscernible; maxillary palpus cylindrical, brown, longer than proboscis.

***Antenna*:** brown; scape white setose dorsally, asetose ventrally; pedicel white setose dorsally and ventrally; postpedicel indiscernible (broken).

***Thorax*:** dark brown, predominantly light brown pubescent; scutum uniformly black, surface microrugose (slightly rugose 'imitating' pubescence), predominantly light brown pubescent, broad sublateral stripes (interrupted by transverse suture) and narrow paramedian stripes merging postsuturally and not reaching posterior margin apubescent, scutal setation comprised of long white to yellow setae in pubescent areas; dc setae presuturally white, postsuturally absent, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent medially, grey pubescent laterally, long yellowish macrosetose; proepimeron grey pubescent, asetose, antepronotum antero-medially smooth (without any indentation); lateral postpronotum short yellowish setose; postpronotal lobe yellow, white pubescent, short yellowish setose; scutellum light brown pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum light brown pubescent, asetose; anatergite light brown pubescent, asetose; katatergite light brown pubescent, long white setose, elevated and smoothly convex; anepisternum light brown pubescent, anteriorly asetose, posteriorly asetose, otherwise asetose; katepisternum light brown pubescent, asetose; anepimeron light brown pubescent, single long yellowish seta dorso-medially; katepimeron light brown pubescent, asetose; meron light brown pubescent, asetose; metakatepisternum large; metanepisternum light brown pubescent, asetose; metepimeron brown (same color as T1), light brown pubescent, short white setose, ± flat, infra-halter sclerite absent.

***Legs*:** light brown to brown, setation comprised of white setae, yellow macrosetae; pro coxa sparsely grey pubescent, long yellowish macrosetose; mes coxa sparsely grey pubescent, long yellowish macrosetose; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), sparsely grey pubescent, long yellowish macrosetose; met trochanter sparsely setose medially; pro + mes femur brown, met femur brown, distinctly clubbed for nearly entire length, macrosetose with thickened spine-like macrosetae on protuberances in 1 antero-ventral and 1 postero-ventral rows, 2–3 macrosetae distally in anterior row, postero-ventrally long white, appressed setose; pro tibia straight; mes tibia straight; met tibia laterally arched, met tibia cylindrical with distinct ventral keel terminating into distinct spur, macroseta at tip of spur, almost reaching tip of 1st tarsomere, postero-laterally short white, appressed setose; pro + mes tarsomere 1 approximately as long as individual tarsomeres 2, 3, or 4, met tarsomere 1 as long as individual tarsomeres 2, 3, or 4; pulvillus reduced, ½ length of well-developed claw; setiform empodium absent.

***Wing*:** length = 9.9 mm; slightly brown stained throughout, veins brown, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with R_1; Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at r-m (not curving anteriorly), M_1 (or M_1+M_2) terminates in C; base of M_3+M_4 present, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3

narrow proximally); CuP straight, cell cup wide, CuP and wing margin further apart proximally than distally; alula entirely reduced (nearly straight wing margin); halter light brown, pubescent, dorsally asetose, ventrally yellow setose.

***Abdomen*:** brown, setation comprised of scattered short white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1–6 dark brown with light yellow posterior margin narrowest medially, T7 dark brown; T1–2 sparsely grey pubescent, T3–7 apubescent; T1–7 short white setose; S1–7 brown; S apubescent; S1–7 sparsely short white setose; bullae on T2 oval, small, yellow, surface entirely smooth, T2 surface anterior to bullae smooth.

♀ abdomen and genitalia: densely arranged anteriorly directed setae present on T7–8 and S7–8; T8 anterior apodeme indiscernible (not dissected), auxiliary spiracle indiscernible (not dissected); T9 formed by wide, rectangular sclerite with median protuberance; T9+10 entirely fused (sclerites indistinguishable), T10 divided into 2 heavily sclerotized acanthophorite plates; 6 acanthophorite spines per plate.

Male. *Head*: black, facial gibbosity yellow, in general densely grey pubescent, white setose, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex same as at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin, vertex grey pubescent, white setose; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, white; parafacial area approximately as wide as ¾ width of central gibbosity (at same level); frons not elevated, grey pubescent, white setose; occiput grey pubescent, white setose, median occipital sclerite yellowish macrosetose; pocl macrosetae absent; postgena sparsely grey pubescent, long, sparsely white setose; clypeus comprised of single sclerite, entirely sclerotized medially, flat to protruding (convex) ventrally, ventrally expanded, anterior to proboscis (almost covering it), laterally connected to face by sclerotized cuticle; proboscis very short, vestigial, knob-like, brown; labellum indiscernible, length indiscernible, sclerotization indiscernible; maxillary palpus cylindrical, brown, longer than proboscis.

***Antenna*:** brown; scape white setose dorsally, asetose ventrally; pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal ⅓, symmetrically bulbous in distal 2/3, ≥ 3.0 times as long as combined length of scape and pedicel, asetose; apical seta-like sensory element situated apically in cavity on postpedicel.

***Thorax*:** dark brown, predominantly grey pubescent; scutum uniformly black, surface microrugose (slightly rugose 'imitating' pubescence), predominantly grey pubescent, broad sublateral stripes (interrupted by transverse suture) and narrow paramedian stripes merging postsuturally and not reaching posterior margin apubescent, scutal setation comprised of long white to yellow setae in pubescent areas; dc setae presuturally white, postsuturally absent, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent medially, grey pubescent laterally, long yellowish macrosetose; proepimeron grey pubescent, asetose, antepronotum antero-medially smooth (without any indentation); lateral postpronotum short yellowish setose; postpronotal lobe yellow, white pubescent, short yellowish setose; scutellum sparsely grey pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum grey pubescent, asetose; anatergite grey pubescent, asetose;

katatergite grey pubescent, long white setose, elevated and smoothly convex; anepisternum sparsely grey pubescent, anteriorly asetose, posteriorly asetose, otherwise asetose; katepisternum sparsely grey pubescent, few white setae posteriorly; anepimeron sparsely grey pubescent, single long yellowish seta dorso-medially; katepimeron sparsely grey pubescent, white setose; meron sparsely grey pubescent, asetose; metakatepisternum large; metanepisternum grey pubescent, asetose; metepimeron brown (same color as T1), grey pubescent, short white setose, ± flat, infra-halter sclerite absent.

***Legs*:** light brown to brown, setation comprised of white setae, yellow macrosetae; pro coxa sparsely grey pubescent, long white macrosetose; mes coxa sparsely grey pubescent, short white setose; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), sparsely grey pubescent, short white setose; met trochanter sparsely setose medially; pro + mes femur brown, met femur brown, distinctly clubbed for nearly entire length, macrosetose with thickened spine-like macrosetae on protuberances in 1 antero-ventral and 1 postero-ventral rows, 2–3 macrosetae distally in anterior row, postero-ventrally long white, appressed setose; pro tibia straight; mes tibia straight; met tibia laterally arched, met tibia cylindrical with distinct ventral keel terminating into distinct spur, spur almost reaching tip of 1st tarsomere, postero-laterally short white, appressed setose; pro + mes tarsomere 1 approximately as long as individual tarsomeres 2, 3, or 4, met tarsomere 1 as long as individual tarsomeres 2, 3, or 4; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; setiform empodium absent.

***Wing*:** length = 5.6–7.6 mm; slightly brown stained throughout, veins brown, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with R_1; Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at r-m (not curving anteriorly), M_1 (or M_1+M_2) terminates in C; base of M_3+M_4 present, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3 narrow proximally); CuP straight, cell cup wide, CuP and wing margin further apart proximally than distally; alula entirely reduced (nearly straight wing margin); halter light brown, pubescent, dorsally asetose, ventrally yellow setose.

***Abdomen*:** brown, setation comprised of scattered short white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1–7 brown with narrow yellow posterior margin; T sparsely grey pubescent; T1–7 short white setose; S1–7 light brown; S apubescent; S1–7 sparsely short white setose; bullae on T2 oval, small, yellow, surface entirely smooth, T2 surface anterior to bullae smooth.

♂ ***abdomen and terminalia*:** T1–7 well-developed, entirely sclerotized, T8 postero-medially weakly sclerotized, with anterior transverse sclerotized bridge connecting lateral sclerites; T7–8 anteriorly with 2 lateral apodemes; T8 auxiliary spiracle present; S6 regular, without any special setation postero-medially; S8 simple plate, entire (undivided) ventro-medially, not fused to T8 dorso-laterally; epandrium formed by 2 sclerites, separated medially and fused anteriorly, distally in dorsal view blunt, evenly rounded; subepandrial sclerite without lateral or median protuberances; hypandrium concave, cup-shaped, entirely sclerotized ventrally, entirely fused with gonocoxite, forming a gonocoxite-

hypandrial complex, supra-hypandrial sclerite absent; gonocoxite simple, short, hook-like, without median or lateral protuberance, gonocoxal apodeme absent; 2 functional phallic prongs, short and wide, medio-distally connected, parallel or diverging laterally, distally straight or only diverging slightly laterally; phallic epimere absent; lateral ejaculatory process absent; ejaculatory apodeme formed by single dorso-ventrally oriented plate; ventro-median margin of parameral sheath heavily sclerotized (appearing entirely closed); parameral sheath long, sperm sac entirely covered; sperm sac appearing weakly sclerotized.

Type locality. Namibia: Kunene: Orupembe (= Anabib), 24 km S (18°23'00"S, 012°13'00"E, -18.38333, 12.21667).

Material examined. Namibia: Kunene: 1♀ Kaokoveld, Orupembe, 24 km S, 18°21'21"S, 012°28'35"E, 1951-06-09, Swedish South Africa Expedition (MZLU-2143:1, Holotype, MZLU); 2♂ Kaokoveld, Orupembe, 18°09'37"S, 012°33'44"E, 1951-06-07–1951-06-09, Swedish South Africa Expedition (MZLU-2143:2, MZLU-2143:3, Paratypes, MZLU).

Distribution, biodiversity hotspots, phenology, and biology. Known only from two localities in the northern Namib Desert in Namibia (Fig. 56). A rarely collected species known only from three specimens from two collecting events in 1951 (Table 1). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in June in early winter (Table 2), which is a time following a moister period and lower temperatures in this part of the Namib Desert (data for Anabib, Namibia, see https://www.worldweatheronline.com/anabib-weather/kunene/na.aspx). Nothing is known of the biology.

Remarks. The size difference among the three known specimens is quite significant. The ♀ holotype (wing length 9.9 mm) is much larger than the two ♂ paratypes (wing length 5.6–7.7 mm) and represents the largest fly in the genus *Eremohaplomydas*.

***Eremohaplomydas gobabebensis* sp. nov.**
http://zoobank.org/745D49C1-62B8-4884-9F7F-2B82523373D3
GBIF https://www.gbif.org/species/1591415 (genus record)
Figs 10–15, 32, 53, 56

Diagnosis. The species is distinguished from congeners by the densely arranged dorso-ventrally flattened setae on legs, the absence of the base of vein M_3+M_4, the overall golden pubescence, and the restricted distribution in the central Namib Desert.

Etymology. This species is named after the Gobabeb Namib Research Institute (www.gobabeb.org) where it was collected for the first time in November 2018. The specific epithet is to be treated as a noun in apposition.

Description. Female. unknown.

Male. ***Head*:** black, facial gibbosity brown, in general golden pubescent, ventrally and posteriorly white pubescent, white setose, laterally compressed setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex larger than at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin, vertex golden pubescent, white setose;

Figures 10–12. *Eremohaplomydas gobabebensis* sp. nov. (♂ paratype, USNMENT01518012, Zenodo https://doi.org/10.5281/zenodo.6083928): **10** dorsal (Zenodo https://doi.org/10.5281/zenodo.6083969) **11** lateral (https://doi.org/10.5281/zenodo.6083971) **12** head anterior (https://doi.org/10.5281/zenodo.6083979). Scale bars: 5 mm.

ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, white; parafacial area approximately as wide as ½ width of central facial gibbosity (at same level); frons not elevated, golden pubescent, white setose; occiput predominantly white pubescent, dorsally golden pubescent, white setose, median occipital sclerite white setose, laterally compressed setae; pocl macrosetae absent; postgena apubescent, long, sparsely white setose; clypeus comprised of inverted U-shaped sclerite, dorsal ½ sclerotized medially to form plate, recessed (concave), ventrally simple, posterior to proboscis, laterally connected to face by sclerotized cuticle; proboscis very short, vestigial, knob-like, yellow; labellum small, as wide as prementum, length indiscernible, sclerotization indiscernible; maxillary palpus laterally compressed (triangular), light brown, slightly longer than proboscis.

***Antenna*:** light brown to brown; scape white setose dorsally, asetose ventrally; pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal 1/5, symmetrically bulbous in distal 4/5, ≥ 5.0 times as long as combined length of scape and pedicel, asetose; apical seta-like sensory element situated apically in cavity on postpedicel.

***Thorax*:** brown, scutum golden pubescent, pleura white pubescent; scutum uniformly black, surface entirely smooth, golden pubescent, scutal setation comprised of long white setae with distinct rows of long dorsocentral setae and dense lateral scutal setae; dc setae pre- and postsuturally white, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent, long white setose; proepimeron grey pubescent,

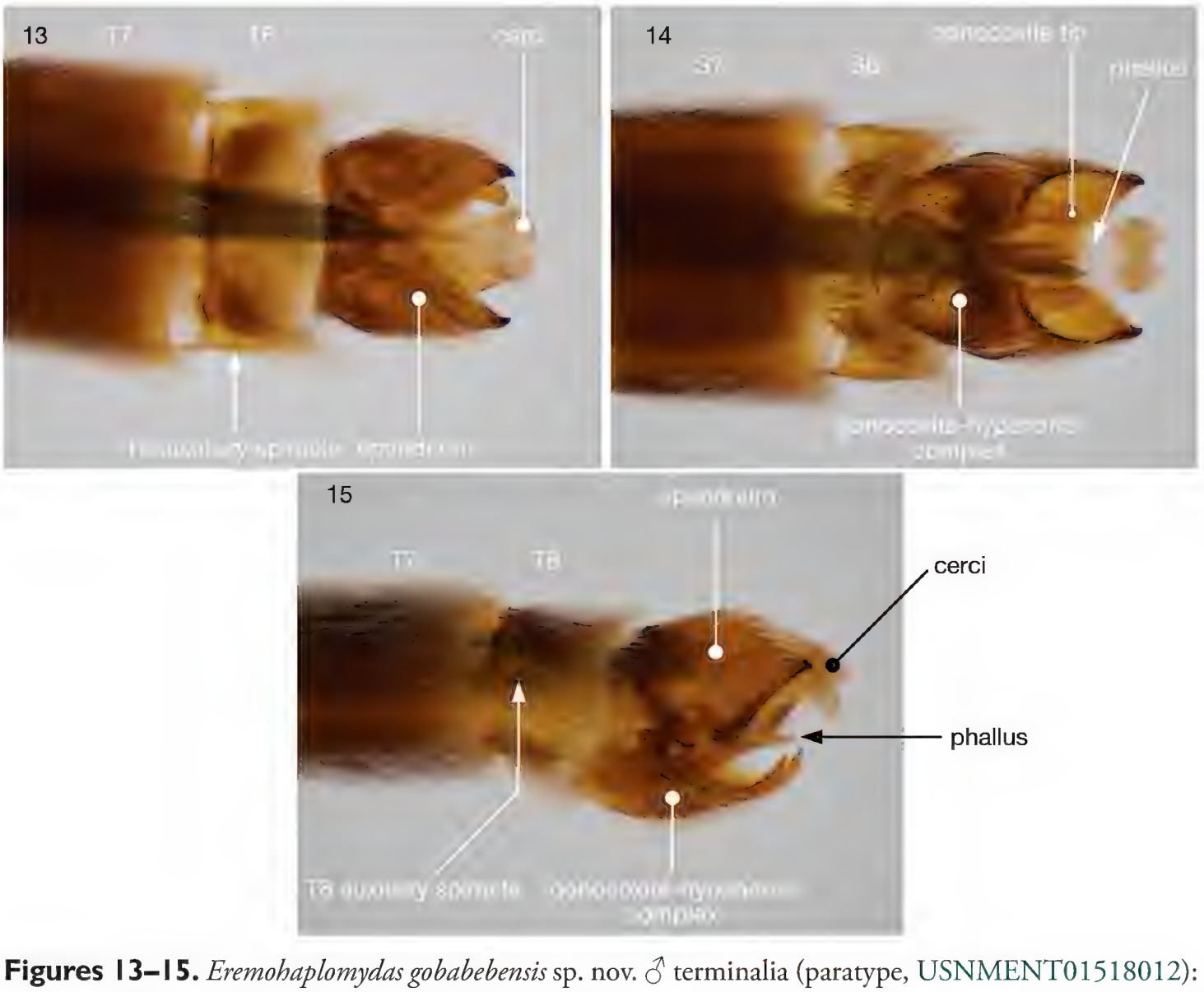
asetose; antepronotum antero-medially smooth (without any indentation); lateral postpronotum long white setose; postpronotal lobe light brown, golden to light brown pubescent, long white setose; scutellum golden pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum golden pubescent, asetose; anatergite golden pubescent, asetose; katatergite white pubescent, long white setose, slightly elevated, smoothly convex; anepisternum white pubescent, anteriorly white setose, posteriorly densely long white setose, scattered long white setose centrally; katepisternum dorsally white pubescent, ventrally apubescent, asetose; anepimeron white pubescent, long white setose; katepimeron white pubescent, asetose; meron white pubescent dorsally, sparsely white pubescent ventrally, asetose; metakatepisternum large; metanepisternum white pubescent, asetose; metepimeron yellow (same color as T1), white pubescent, long white setose, ± flat, infra-halter sclerite absent.

***Legs*:** light brown to brown, setation comprised of white laterally compressed setae predominantly covering surface; pro coxa apubescent, sparse white laterally compressed setae; mes coxa apubescent, asetose anteriorly, short white laterally compressed setae posteriorly; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), apubescent, asetose anteriorly, short white laterally compressed setae posteriorly; met trochanter setose medially; pro + mes femur light brown to brown, met femur light brown to brown, distinctly clubbed for nearly entire length, macrosetose, 1 antero-ventral and 1 postero-ventral row of macrosetae, postero-ventrally long white, appressed setose; pro tibia laterally arched; mes tibia laterally arched; met tibia laterally arched, met tibia cylindrical with ventral keel terminating into distinct spur, spur not projecting beyond tip of tibia, postero-laterally long white, appressed setose; pro + mes tarsomere 1 approximately as long as individual tarsomeres 2, 3, or 4, met tarsomere 1 as long as individual tarsomeres 2, 3, or 4; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; setiform empodium absent.

***Wing*:** length = 4.2–5.7 mm; hyaline throughout, veins light yellow, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with R_1; Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1 and R_4 simultaneously; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 curves slightly anteriorly at r-m, M_1 (or M_1+M_2) terminates in C (not reaching wing margin); base of M_3+M_4 absent, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3 narrow proximally); CuP straight, cell cup wide, CuP and wing margin further apart proximally than distally; alula well-developed; halter light yellow, apubescent, asetose.

***Abdomen*:** light brown to brown, setation comprised of dense long white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1–4 light brown, T5–7 brown; T entirely golden pubescent; T1–7 long white setose; S1–5 brown with white posterior margin, S6–7 dark brown; S apubescent; S1 asetose, S2–7 long white setose; bullae on T2 oval, brown, surface entirely smooth, T2 surface anterior to bullae smooth.

♂ ***abdomen and terminalia*:** T1–8 well-developed; T7–8 anteriorly with 2 lateral apodemes; S6 regular, without any special setation postero-medially; S8 simple plate, entire (undivided) ventro-medially, not fused to T8 dorso-laterally; epandrium formed by single sclerite (fused medially ± entirely), distally in dorsal view pointed postero-



Figures 13–15. *Eremohaplomydas gobabebensis* sp. nov. ♂ terminalia (paratype, USNMENT01518012): **13** dorsal (Zenodo https://doi.org/10.5281/zenodo.6083973) **14** ventral (https://doi.org/10.5281/zenodo.6083977) **15** lateral (https://doi.org/10.5281/zenodo.6083975). Magnification = 75×.

laterally; subepandrial sclerite without lateral or median protuberances; hypandrium ± flat, divided ventro-medially by unsclerotized area into 2 sclerotized halves, entirely fused with gonocoxite, forming a gonocoxite-hypandrial complex, supra-hypandrial sclerite absent; gonocoxite simple, short, hook-like, without median or lateral protuberance, gonocoxal apodeme absent; 2 functional phallic prongs, short with broad lateral flange, medio-distally connected, parallel or diverging laterally, distally straight or only diverging slightly laterally; phallic epimere absent; lateral ejaculatory process absent; ejaculatory apodeme formed by single dorso-ventrally oriented plate; ventro-median margin of parameral sheath heavily sclerotized (appearing entirely closed); parameral sheath long, sperm sac entirely covered; sperm sac appearing ± heavily sclerotized.

Type locality. Namibia: Erongo: Namib-Naukluft National Park, Gobabeb 20 km NW on D1983, Kuiseb riverbed (23°24'56"S, 014°54'43"E, -23.41556, 14.91194).

Material examined. Namibia: Erongo: 1♂ Namib-Naukluft National Park, Gobabeb 20 km NW on D1983, Kuiseb riverbed, 23°24'56"S, 014°54'43"E, 317 m, 2018-11-24 collected a.m. (9:00–noon), dry, sandy, partly wooded riverbed, resting on sand, Dikow, T. (USNMENT01518262, Holotype, NMNW); 1♂ Namib-Naukluft National Park, Gobabeb 20 km NW on D1983, Kuiseb riverbed, 23°24'56"S, 014°54'43"E, 317 m, 2018-11-24 collected a.m. (9:00–noon), dry, sandy, partly wooded riverbed,

resting on sand, Dikow, T. (USNMENT01518263, Paratype, NMNW); 1♂ Namib-Naukluft National Park, Gobabeb 20 km NW on D1983, Kuiseb riverbed, 23°24'56"S, 014°54'43"E, 317 m, 2018-11-24 collected a.m. (9:00–noon), dry, sandy, partly wooded riverbed, resting on sand, Dikow, T. (USNMENT01518261, Paratype, USNM); 1♂ Namib-Naukluft National Park, Gobabeb 20 km NW on D1983, Kuiseb riverbed, 23°24'56"S, 014°54'43"E, 317 m, 2018-11-24 collected a.m. (9:00–noon), dry, sandy, partly wooded riverbed, resting on sand, Dikow, T. (USNMENT01518260, Paratype, USNM); 1♂ Namib-Naukluft National Park, Gobabeb, dunes W of Kuiseb riverbed, 23°33'48"S, 015°01'58"E, 401 m, 2018-11-21 collected a.m. (9:00–noon), small vegetated dunes, resting on sand, Dikow, T. (USNMENT01518012, Paratype, USNM); 1♂ Namib-Naukluft National Park, Gobabeb, small dunes W of Kuiseb River, 23°33'50"S, 015°01'59"E, 398 m, 2018-11-23 collected p.m. (noon–15:00), partly vegetated dune, resting on sand, Dikow, T. (USNMENT01518339, Paratype, USNM).

Distribution, biodiversity hotspots, phenology, and biology. Known only from two localities in the central Namib Desert in Namibia (Fig. 56). A rarely collected species known only from seven specimens from three collecting events in 2018 (Table 1). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in November in late spring (Table 2), which is a time at the beginning of a moister period and rising temperatures in this part of the Namib Desert (data for Gobabeb, Namibia, see https://www.worldweatheronline.com/gobabeb-weather/erongo/na.aspx). So far, only males have been collected and they were observed to fly very low above the ground and appeared to inspect the base of single grass plants and dart at high speed across the sand to the next plant. At the Gobabeb locality, the flies were collected flying among *Centropodia glauca* (Poaceae, Gha Grass, https://www.gbif.org/species/5680035) and at the 20 km N Gobabeb locality the flies darted among *Cladoraphis spinosa* (Poaceae, Spiny Love Grass, https://www.gbif.org/species/4152290, see habitat photographs with the grasses in the foreground in Figs 1, 2). Both grass species are native and widely distributed in the western parts of southern Africa including the Namib Desert (van Oudtshoorn 2012). The male flies possibly inspected the grasses in search for females resting in the shade although the junior author was not able to observe or collect any females. In general, the flies were very difficult to observe and collect due to their high flight speed, light colouration, and small size.

Remarks. Wharton (1982) did not collect this species in his seminal year-long study of Mydidae at Gobabeb.

***Eremohaplomydas stomachoris* sp. nov.**
http://zoobank.org/47E76F26-91AF-4DFD-80ED-6CDCC4DBF994
GBIF https://www.gbif.org/species/1591415 (genus record)
Figs 16–18, 33, 57

Diagnosis. The species is distinguished from congeners by the macrosetose dorso-median occipital setae, the small and slender size (wing length 6.3 mm), and the restricted distribution in the northern Namib Desert.

Figures 16–18. *Eremohaplomydas stomachoris* sp. nov. (♀ holotype, AAM-003035, Zenodo https://doi.org/10.5281/zenodo.6083930): **16** dorsal (https://doi.org/10.5281/zenodo.6083983) **17** lateral (https://doi.org/10.5281/zenodo.6083985) **18** head anterior (https://doi.org/10.5281/zenodo.6083987). Scale bars: 5 mm.

Etymology. Greek *stoma* = mouth, *choris* = without. The specific epithet refers to the extremely short and minute proboscis in this species.

Description. Female. ***Head*:** black, facial gibbosity brown, in general golden pubescent, ventrally and posteriorly white pubescent, white setose, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex larger than at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin, vertex golden pubescent, light brown; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, sparse, white; parafacial area approximately as wide as ½ width of central facial gibbosity (at same level); frons not elevated, golden pubescent, yellow; occiput predominantly grey pubescent, dorsally golden pubescent, yellowish to light brown setose, median occipital sclerite yellowish macrosetose; pocl macrosetae absent; postgena sparsely white pubescent, long, sparsely white setose; clypeus comprised of single sclerite, entirely sclerotized medially, flat to protruding (convex) ventrally, ventrally simple, posterior to proboscis, laterally connected to face by sclerotized cuticle; proboscis very short, vestigial, knob-like, light brown; labellum small, as wide as prementum, length indiscernible, sclerotization indiscernible; maxillary palpus laterally compressed (triangular), light brown, slightly longer than proboscis.

***Antenna*:** brown; scape brown setose dorsally, asetose ventrally; pedicel light brown setose dorsally and ventrally; postpedicel cylindrical in proximal ¼, symmetrically

bulbous in distal ¾, ≥ 4.0 times as long as combined length of scape and pedicel, asetose; apical seta-like sensory element situated apically in cavity on postpedicel.

***Thorax*:** light brown, predominantly grey pubescent; scutum black, brown posteriorly, surface entirely smooth, predominantly grey pubescent, broad median and sublateral stripes reaching transverse suture brown pubescent, postsuturally with 2 large sublateral sparsely grey pubescent spots, scutal setation comprised of distinct rows of long dorsocentral setae and lateral scutal setae; dc setae pre- and postsuturally white or yellow, acr setae absent, lateral scutal setae yellow, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent, long white setose; proepimeron grey pubescent, asetose; antepronotum antero-medially smooth (without any indentation); lateral postpronotum long white setose; postpronotal lobe yellow, white pubescent, long white setose; scutellum grey pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum grey pubescent, asetose; anatergite grey pubescent, asetose; katatergite grey pubescent, long white setose, slightly elevated, smoothly convex; anepisternum grey pubescent, anteriorly white setose, posteriorly long white setose, scattered white setose antero-ventrally; katepisternum dorsally grey pubescent, ventrally apubescent, single white seta posteriorly; anepimeron grey pubescent, long white setose; katepimeron grey pubescent, asetose; meron grey pubescent dorsally, apubescent ventrally, asetose; metakatepisternum large; metanepisternum grey pubescent, asetose; metepimeron yellow (contrasting color of T1), grey pubescent, long white setose, ± flat, infra-halter sclerite absent.

***Legs*:** light brown to brown, setation comprised of white to yellowish setae, femur with laterally compressed setae; pro coxa sparsely white pubescent, short white macrosetose; mes coxa sparsely white pubescent, short white macrosetose anteriorly, long white laterally compressed setae posteriorly; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), sparsely white pubescent, short white macrosetose anteriorly, long white laterally compressed setae posteriorly; met trochanter sparsely setose medially; pro + mes femur light brown to brown, met femur light brown to brown, evenly clubbed in distal ¾, macrosetose, 1 antero-ventral and 1 postero-ventral row of macrosetae, postero-ventrally long white, appressed setose; pro tibia laterally arched; mes tibia laterally arched; met tibia straight, met tibia cylindrical with distinct ventral keel without terminal spur, 2 long macrosetae originating near tip of keel, postero-laterally regular setose only; pro + mes tarsomere 1 approximately as long as individual tarsomeres 2, 3, or 4, met tarsomere 1 as long as individual tarsomeres 2, 3, or 4; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; setiform empodium absent.

***Wing*:** length = 6.3 mm; hyaline throughout, veins light brown, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with R_1; Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1 and R_4 simultaneously; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at r-m (not curving anteriorly), M_1 (or M_1+M_2) terminates in C (not reaching wing margin); base of M_3+M_4 present, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3 narrow proximally); CuP straight, cell

cup wide, CuP and wing margin further apart proximally than distally; alula well-developed; halter light yellow, apubescent, asetose.

***Abdomen*:** light brown to brown, setation comprised of scattered white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1 brown with yellowish posterior margin, T2–7 brown medially and laterally with yellowish posterior margins, sub-laterally yellowish, slightly angled longitudinal striping; T1 grey pubescent, T2–3 sparsely grey pubescent narrowly anteriorly and medially, T4–7 apubescent; T1–7 short white setose; S1–7 light brown; S apubescent; S1–7 sparsely short white setose; bullae on T2 oval, small, yellow, surface entirely smooth, T2 surface anterior to bullae smooth.

♀ ***abdomen and genitalia*:** densely arranged anteriorly directed setae present on T7–8 and S7–8; T8 anterior apodeme indiscernible (not dissected), auxiliary spiracle indiscernible (not dissected); T9 formed by wide, rectangular sclerite with median protuberance; T9+10 entirely fused (sclerites indistinguishable), T10 divided into 2 heavily sclerotized acanthophorite plates; 5–7 acanthophorite spines per plate.

Male. unknown.

Type locality. Namibia: Kunene: Kaokoveld, Orupembe, 21 km S (18°19'24"S, 012°29'12"E, -18.32333, 12.48667).

Material examined. Namibia: Kunene: 1♀ Kaokoveld, Orupembe, 21 km S, 18°19'24"S, 012°29'12"E, 1970-05-01, Brown, H. (AAM-003035, Holotype, SANC).

Distribution, biodiversity hotspots, phenology, and biology. Known only from a single locality in the Namib Desert in northern Namibia (Fig. 57). A rarely collected species known only from a single female specimen collected in 1970 (Table 1). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in May in mid-autumn (Table 2), which is a time at the end of a moister period and decreasing temperatures in this part of the Namib Desert (data for Anabib, Namibia, see https://www.worldweatheronline.com/anabib-weather/kunene/na.aspx). Nothing is known of the biology.

Remarks. The type locality of *Eremohaplomydas stomachoris* sp. nov. lies geographically very close to that of *Eremohaplomydas desertorum*. However, the single female specimen of *E. stomachoris* sp. nov. is morphologically more similar to *Eremohaplomydas gobabebensis* sp. nov. from the central Namib Desert (more than 600 km further south) than it is to *E. desertorum* (see also Discussion). Furthermore, *E. stomachoris* sp. nov. has been collected in early May, at least a month earlier in autumn than *E. desertorum* (Table 2).

Eremohaplomydas whartoni sp. nov.

http://zoobank.org/6F6B399B-4FB1-4C20-835F-FF5728D529F4
GBIF https://www.gbif.org/species/1591415 (genus record)
Figs 19–30, 34, 57

Diagnosis. The species is distinguished from congeners by the overall light brown colouration, the reduced alula on the wing, the apubescent abdominal tergites 5–8 in females, and the restricted distribution in the central Namib Desert.

Figures 19–24. *Eremohaplomydas whartoni* sp. nov.: **19** ♂ holotype (NMSA-DIP-92011, Zenodo https://doi.org/10.5281/zenodo.6083939), dorsal (https://doi.org/10.5281/zenodo.6084009) **20** same, lateral (https://doi.org/10.5281/zenodo.6084011) **21** same, head anterior (https://doi.org/10.5281/zenodo.6084013) **22** ♀ paratype (NMSA-DIP-92012, https://doi.org/10.5281/zenodo.6083936), head anterior (https://doi.org/10.5281/zenodo.6084007) **23** same, dorsal (https://doi.org/10.5281/zenodo.6084003) **24** same, lateral (https://doi.org/10.5281/zenodo.6084005). Scale bars: 5 mm.

Etymology. This species is named after Dr Robert Wharton, the only collector of this species, in recognition of his year-long seminal study of the Mydidae (and other taxa) of the central Namib Desert at the Gobabeb Namib Research Institute in 1978–1979 (Wharton 1982). The specific name is to be treated as a noun in apposition.

Description. Female. ***Head*:** black, facial gibbosity light brown, in general grey pubescent, white setose, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex same as at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye

margin, vertex grey pubescent, white setose; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, white; parafacial area more than ½ width of central facial gibbosity (at same level); frons not elevated, grey pubescent, white setose; occiput grey pubescent, white setose, median occipital sclerite light brown macrosetose; pocl macrosetae absent; postgena sparsely grey pubescent, long, sparsely white setose; clypeus comprised of single sclerite, entirely sclerotized medially, flat to protruding (convex) ventrally, ventrally expanded, anterior to proboscis (almost covering it), laterally connected to face by sclerotized cuticle; proboscis very short, vestigial, knob-like, brown; labellum indiscernible, length indiscernible, sclerotization indiscernible; maxillary palpus cylindrical, light brown, minute.

***Antenna*:** light brown to brown; scape asetose; pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal ¼, symmetrically bulbous in distal ¾, ≥ 5.0 times as long as combined length of scape and pedicel, asetose; apical seta-like sensory element situated apically in cavity on postpedicel.

***Thorax*:** dark brown, predominantly grey pubescent; scutum uniformly black, surface microrugose (slightly rugose 'imitating' pubescence), predominantly grey pubescent, broad sublateral stripes (interrupted by transverse suture) sparsely grey pubescent, narrow paramedian stripes merging postsuturally and not reaching posterior margin sparsely grey pubescent, scutal setation comprised of long white setae in pubescent areas; dc setae pre- and postsuturally white, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent medially, grey pubescent laterally, long yellowish macrosetose; proepimeron grey pubescent, asetose; antepronotum antero-medially smooth (without any indentation); lateral postpronotum long white setose; postpronotal lobe yellow, grey pubescent, short yellowish setose; scutellum grey pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum grey pubescent, asetose; anatergite grey pubescent, asetose; katatergite grey pubescent, long white setose, elevated and smoothly convex; anepisternum grey pubescent, anteriorly asetose, posteriorly asetose, otherwise asetose; katepisternum sparsely grey pubescent, asetose; anepimeron sparsely grey pubescent, asetose; katepimeron sparsely grey pubescent, asetose; meron sparsely grey pubescent, asetose; metakatepisternum large; metanepisternum grey pubescent, asetose; metepimeron light brown (same color as T1), grey pubescent, long yellowish setose, ± flat, infra-halter sclerite absent.

***Legs*:** yellow to brown, setation comprised of white setae, yellow macrosetae; pro coxa sparsely grey pubescent, short white macrosetose; mes coxa sparsely grey pubescent, short white setose and macrosetose; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), sparsely grey pubescent, short white setose and macrosetose; met trochanter setose medially; pro + mes femur yellow to light brown, met femur light brown to brown, distinctly clubbed for nearly entire length, macrosetose with thickened spine-like macrosetae on protuberances in 1 antero-ventral and 1 postero-ventral rows, 2–3 macrosetae distally in anterior row, postero-ventrally sparse, short white setose; pro tibia laterally arched; mes tibia laterally arched; met tibia laterally arched, met tibia cylindrical with distinct ventral keel terminating into distinct spur, macroseta at tip of spur, almost reaching tip of 1st tarsomere, postero-

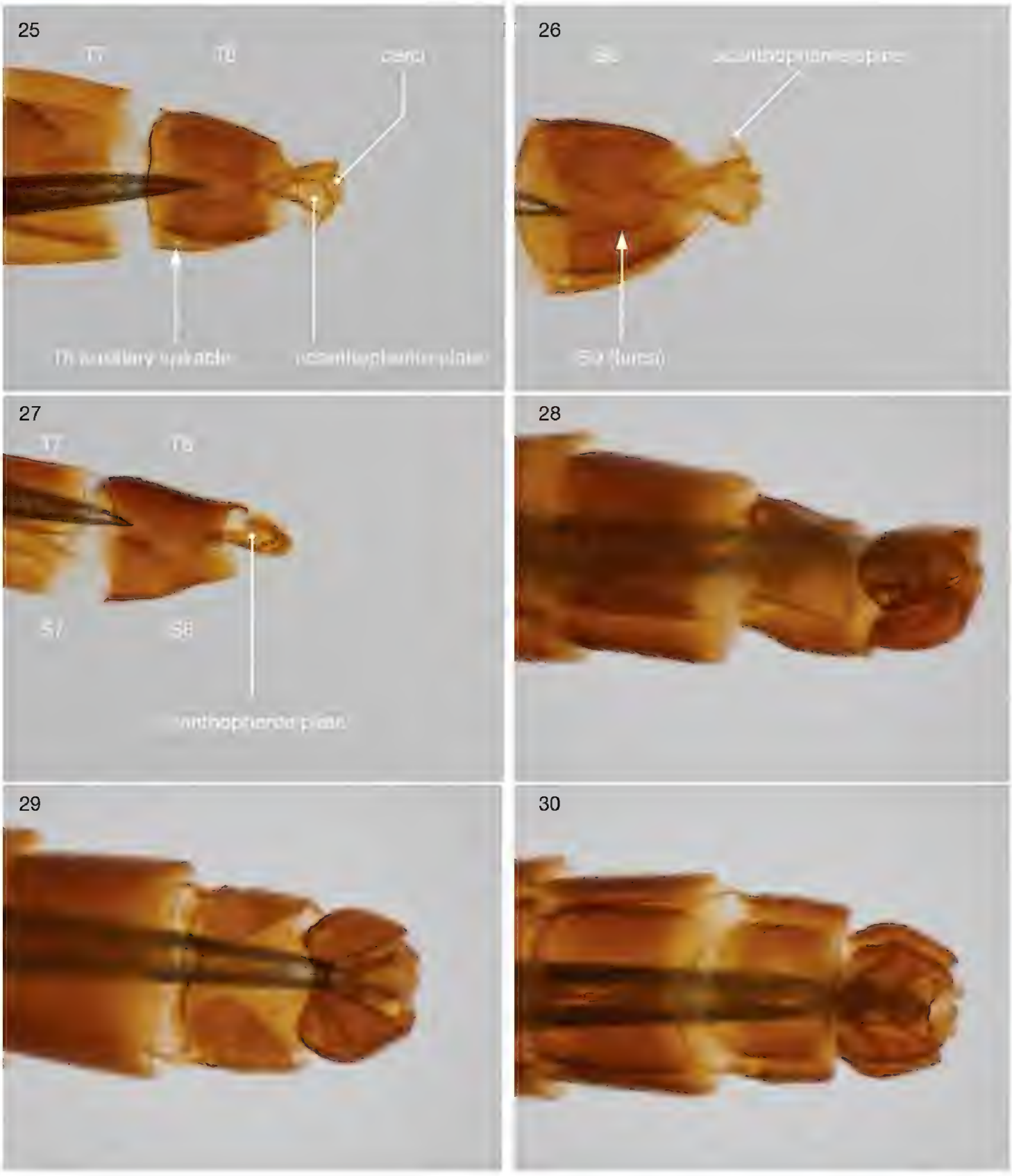
laterally sparse long white, erect setose with setae arranged in distinct row; pro + mes tarsomere 1 as long as tarsomere 2, met tarsomere 1 as long as individual tarsomeres 2, 3, or 4; pulvillus reduced, ½ length of well-developed claw; setiform empodium absent.

***Wing*:** length = 7.0–7.9 mm; hyaline throughout, veins light brown, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with R_1; Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at r-m (not curving anteriorly), M_1 (or M_1+M_2) terminates in C (not reaching wing margin), rarely C; base of M_3+M_4 present, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3 narrow proximally); CuP straight, cell cup wide, CuP and wing margin further apart proximally than distally; alula entirely reduced (nearly straight wing margin); halter light brown, apubescent, dorsally asetose, ventrally yellow setose.

***Abdomen*:** light brown to brown, setation comprised of scattered short white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1–4 light brown with narrow yellowish posterior margins, T5–7 brown with narrow yellowish posterior margins; T1–4 grey pubescent, T5 sparsely grey pubescent medially, T6–7 apubescent; T1 short white setose, T2–6 sparsely very short white setose, T7 short erect white setose; S1 light brown, S2–3 brown with yellowish posterior margins, S4–7 brown; S apubescent; S1–7 sparsely short white setose; bullae on T2 transversely elongate, yellow, surface entirely smooth, T2 surface anterior to bullae smooth.

♀ ***abdomen and genitalia*:** densely arranged anteriorly directed setae present on T7–8 and S7–8; T8 anterior apodeme present, broad and rectangular, auxiliary spiracle present; T9 formed by wide, rectangular sclerite with median protuberance; T9+10 entirely fused (sclerites indistinguishable), T10 divided into 2 heavily sclerotized acanthophorite plates; 6 acanthophorite spines per plate; 2 spermathecae, all equally large, not differentiated from spermathecal ducts, weakly sclerotized; individual spermathecal duct short; S9 (furca) formed by 1 sclerite, inverted U-shaped (joined anteriorly, separated posteriorly), anterior furcal apodeme present, 2 lateral projections forming divided apodeme, lateral furcal apodeme absent, median furcal bridge absent.

Male. ***Head*:** black, facial gibbosity brown, in general grey pubescent, white setose, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex same as at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin, vertex grey pubescent, white setose; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, white; parafacial area approximately as wide as ½ width of central facial gibbosity (at same level); frons not elevated, grey pubescent, white setose; occiput grey pubescent, white setose, median occipital sclerite light brown macrosetose; pocl macrosetae absent; postgena sparsely grey pubescent, long, sparsely white setose; clypeus comprised of single sclerite, entirely sclerotized medially, flat to protruding (convex) ventrally, ventrally expanded, anterior to proboscis (almost covering it), laterally connected to face by sclerotized cuticle; proboscis very short, vestigial, knob-like, brown; labellum indiscernible, length indiscernible, sclerotization indiscernible; maxillary palpus cylindrical, light brown, minute.



Figures 25–30. *Eremohaplomydas whartoni* sp. nov. ♀ and ♂ terminalia: **25** ♀ paratype (NMSA-DIP-52578, Zenodo https://doi.org/10.5281/zenodo.6083932), dorsal (https://doi.org/10.5281/zenodo.6083991) **26** same, ventral (https://doi.org/10.5281/zenodo.6083995) **27** same, lateral (https://doi.org/10.5281/zenodo.6083993) **28** ♂ paratype (NMSA-DIP-52577, https://doi.org/10.5281/zenodo.6083934), lateral (https://doi.org/10.5281/zenodo.6083999) **29** same, dorsal (https://doi.org/10.5281/zenodo.6083997) **30** same, ventral (https://doi.org/10.5281/zenodo.6084001). Magnification 25–27 = 50×, 28–30 = 75×.

***Antenna*:** light brown to brown; scape white setose dorsally, asetose ventrally; pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal ⅓, symmetrically bulbous in distal 2/3, ≥ 3.0 times as long as combined length of scape and pedicel, asetose; apical seta-like sensory element situated apically in cavity on postpedicel.

***Thorax*:** black, predominantly grey pubescent; scutum uniformly black, surface microrugose (slightly rugose 'imitating' pubescence), predominantly grey pubescent, broad sublateral stripes (interrupted by transverse suture) and narrow paramedian stripes merging postsuturally and not reaching posterior margin apubescent, scutal setation comprised of long white setae in pubescent areas; dc setae pre- and postsuturally white, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent medially, grey pubescent laterally, long yellowish macrosetose; proepimeron grey pubescent, asetose; antepronotum antero-medially smooth (without any indentation); lateral postpronotum long white setose; postpronotal lobe light brown, grey pubescent, short yellowish setose; scutellum grey pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum grey pubescent, asetose; anatergite grey pubescent, asetose; katatergite grey pubescent, long white setose, elevated and smoothly convex; anepisternum grey pubescent, anteriorly asetose, posteriorly asetose, otherwise asetose; katepisternum grey pubescent, asetose; anepimeron grey pubescent, single long yellowish seta dorso-medially; katepimeron grey pubescent, asetose; meron grey pubescent, asetose; metakatepisternum large; metanepisternum grey pubescent, asetose; metepimeron brown (same color as T1), grey pubescent, long white setose, ± flat, infra-halter sclerite absent.

***Legs*:** brown, setation comprised of white setae, yellow macrosetae; pro coxa sparsely grey pubescent, short white macrosetose; mes coxa sparsely grey pubescent, short white setose; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), sparsely grey pubescent, short white setose; met trochanter setose medially; pro + mes femur brown, met femur brown, distinctly clubbed for nearly entire length, macrosetose with thickened spine-like macrosetae on protuberances in 1 antero-ventral and 1 postero-ventral rows, 2–3 macrosetae distally in anterior row, postero-ventrally sparse, long white erect setose; pro tibia laterally arched; mes tibia laterally arched; met tibia laterally arched, met tibia cylindrical with distinct ventral keel terminating into distinct spur, macroseta at tip of spur, almost reaching tip of 1st tarsomere, postero-laterally sparse long white, erect setose with setae arranged in distinct row; pro + mes tarsomere 1 as long as tarsomere 2, met tarsomere 1 as long as individual tarsomeres 2, 3, or 4; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; setiform empodium absent.

***Wing*:** length = 5.0–7.0 mm; hyaline throughout, veins light brown, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with R_1; Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 straight at r-m (not curving anteriorly), M_1 (or M_1+M_2) terminates in C (not reaching wing margin), rarely C; base of M_3+M_4 present, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3 narrow proximally); CuP straight, cell cup wide, CuP and wing margin further apart proximally than distally; alula entirely reduced (nearly straight wing margin); halter light brown, apubescent, dorsally asetose, ventrally yellow setose.

***Abdomen*:** brown, setation comprised of scattered short white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1–7 brown with yellow posterior margins, dark brown lateral margins; T entirely grey pubescent; T1–7 short white setose; S1 brown, S2–6 brown with yellow posterior margins, S7 brown; S apubescent; S1–7 short white setose; bullae on T2 oval, small, yellow, surface entirely smooth, T2 surface anterior to bullae smooth.

♂ ***abdomen and terminalia*:** T1–7 well-developed, entirely sclerotized, T8 postero-medially weakly sclerotized, with anterior transverse sclerotized bridge connecting lateral sclerites; T7–8 anteriorly with 2 lateral apodemes; T8 auxiliary spiracle present; S6 regular, without any special setation postero-medially; S8 simple plate, entire (undivided) ventro-medially, not fused to T8 dorso-laterally; epandrium formed by 2 sclerites, separated medially and fused anteriorly, distally in dorsal view blunt, evenly rounded; subepandrial sclerite without lateral or median protuberances; hypandrium concave, cup-shaped, entirely sclerotized ventrally, entirely fused with gonocoxite, forming a gonocoxite-hypandrial complex, supra-hypandrial sclerite absent; gonocoxite simple, long, slightly curved dorsally, without median or lateral protuberance, gonocoxal apodeme absent; 2 functional phallic prongs, short and wide, medio-distally connected, parallel or diverging laterally, distally straight or only diverging slightly laterally; phallic epimere absent; lateral ejaculatory process absent; ejaculatory apodeme formed by single dorso-ventrally oriented plate; ventro-median margin of parameral sheath heavily sclerotized (appearing entirely closed); parameral sheath long, sperm sac entirely covered; sperm sac appearing ± heavily sclerotized.

Type locality. Namibia: Erongo: Gobabeb, 5 km N (23°30'54"S, 015°02'35"E, -23.515, 15.04306).

Material examined. Namibia: Erongo: 1♂ Gobabeb, 5 km N, 23°30'54"S, 015°02'35"E, 1979-05-08, Wharton, R. (NMSA-DIP-92011, Holotype, NMSA); 1♂ Gobabeb, 5 km N, 23°30'54"S, 015°02'35"E, 1979-05-08, Wharton, R. (NMSA-DIP-52603, Paratype, NMSA); 1♂ Gobabeb, plains, 23°33'20"S, 015°02'40"E, 1979-05-12, Wharton, R. (AAM-007357, Paratype, NMNW); 1♂ Gobabeb, plains, 23°33'20"S, 015°02'40"E, 1979-05-12, Wharton, R. (NMSA-DIP-52577, Paratype, NMSA); 1♀ Gobabeb, plains, 23°33'20"S, 015°02'40"E, 1979-05-12, Wharton, R. (NMSA-DIP-92012, Paratype, NMSA); 1♀ Gobabeb, plains, 23°33'20"S, 015°02'40"E, 1979-05-14, Wharton, R. (NMSA-DIP-52578, Paratype, NMSA); 1♂ Gobabeb, plains, 23°33'20"S, 015°02'40"E, 1979-05-11, Wharton, R. (NMSA-DIP-52599, Paratype, NMSA).

Distribution, biodiversity hotspots, phenology, and biology. Known only from two nearby localities in the central Namib Desert in Namibia (Fig. 57). A rarely collected species known only from seven specimens from three collecting events in 1979 (Table 1). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in May in mid-autumn (Table 2), which is after a usually moister period and high temperatures in this part of the Namib Desert (data for Gobabeb, Namibia, see www.worldweatheronline.com/gobabeb-weather-averages/erongo/na.aspx). Wharton (1982, p. 149) stated that he observed an attempted mating by two males with the same female at

13 h 00 on 1979-05-12, which was unsuccessful due to interference (female specimen NMSA-DIP-92012 and male specimens AAM-007357 and NMSA-DIP-52577 (Wharton number 332)). Wharton (1982) furthermore highlighted the fact that *E. whartoni* sp. nov. might only emerge as an imago following the onset of strong autumn winds.

Remarks. Wharton (1982) in his seminal year-long study of Mydidae at Gobabeb discovered this species for the first time (identified as *Eremohaplomydas* sp.) and remains the only collector.

Haplomydas Bezzi, 1924

http://zoobank.org/AA86F72F-7319-43C5-9104-A618FA521E5E
Original description online https://www.biodiversitylibrary.org/page/40677714
GBIF https://www.gbif.org/species/1591511

Haplomydas Bezzi, 1924: 199. Type-species: *Haplomydas crassipes* Bezzi, 1924, by original designation.
Heleomydas Séguy, 1929 - junior synonym; ZooBank http://zoobank.org/48330D1D-A176-4042-9F3C-97EC14FCD173

Diagnosis. The genus can be delineated by the greatly expanded metathoracic femora, the distinct ventral keel terminating into a spur on the metathoracic tibiae, the presence of setae on the posterior anepisternum, the yellow to light brown colouration, and the absence of M_3+M_4 terminating into the costa.

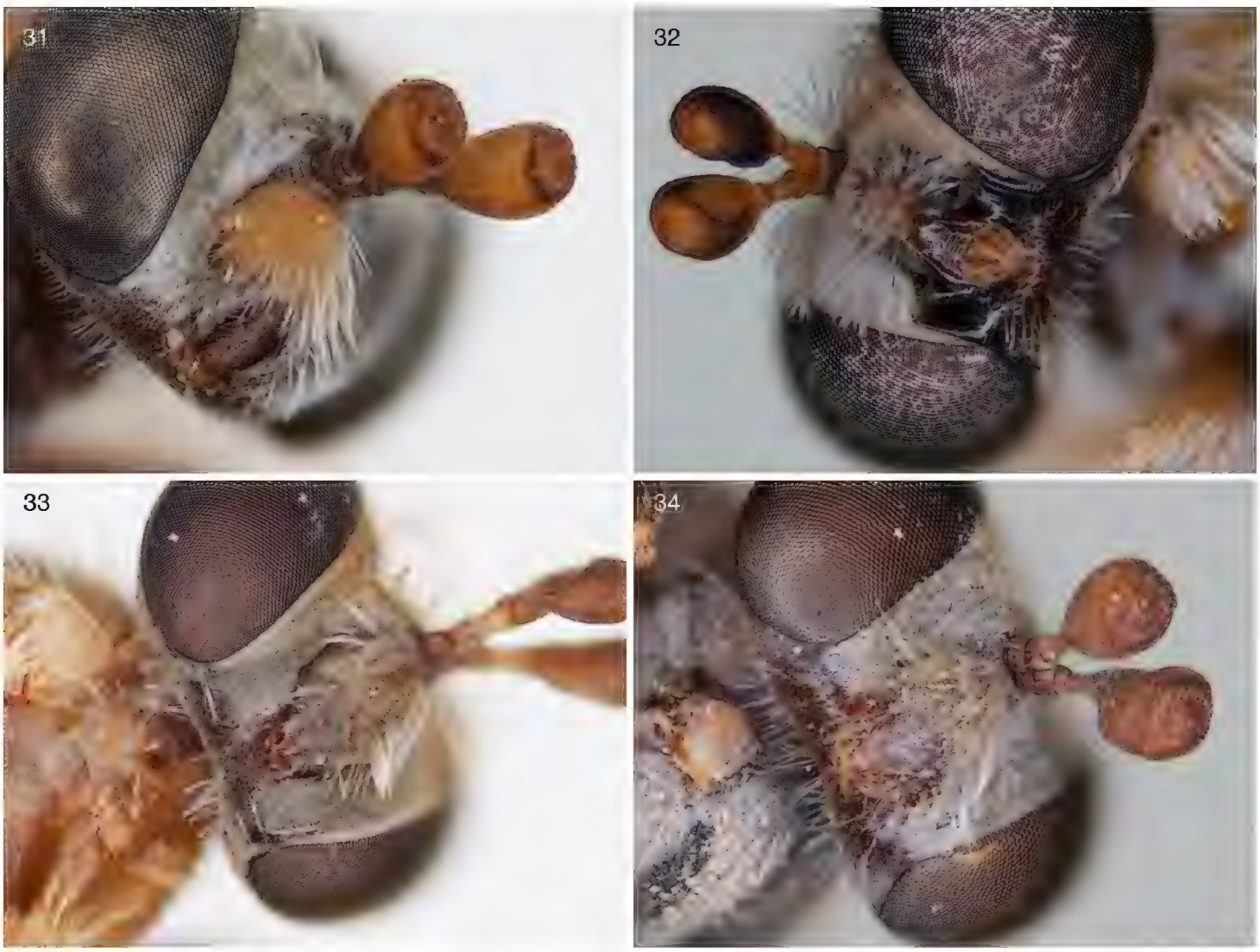
Distribution, biodiversity hotspots, phenology, and biology. Known from diverse localities in Botswana, Mozambique, Namibia, and Zimbabwe (Fig. 57). A relatively commonly collected genus with collecting events between 1917 and 1999 (Table 1). The genus occurs in the Eastern Afromontane biodiversity hotspot in eastern-most Zimbabwe (Fig. 57). Adult flies are active in late summer to autumn (Table 2). Nothing is known of the biology.

Haplomydas crassipes Bezzi, 1924

http://zoobank.org/0D555493-5F42-4B0B-8F43-058DCA9CF4EA
Original description online https://www.biodiversitylibrary.org/page/40677715
GBIF https://www.gbif.org/species/1591512
Figs 35–40, 54, 57

Rhopalia flavomarginata Brunetti, 1929 - junior synonym; ZooBank http://zoobank.org/NomenclaturalActs/82C1F003-57A2-4559-9BB6-0AABDAC5285E
Heleomydas lesnei Séguy, 1929 - junior synonym; ZooBank http://zoobank.org/NomenclaturalActs/3566EA36-0139-4B9C-80CA-3BD2A3BE2250

Diagnosis. See above for genus.



Figures 31–34. Heads of *Eremohaplomydas* species in ventro-lateral view: **31** *E. desertorum* ♂ paratype (MZLU-2143:2, 60× magnification, Zenodo https://doi.org/10.5281/zenodo.6083967) **32** *E. gobabebensis* sp. nov. ♂ holotype (USNMENT01518012, 75×, https://doi.org/10.5281/zenodo.6083981) **33** *E. stomachoris* sp. nov. ♀ holotype (AAM-003035, 75×, https://doi.org/10.5281/zenodo.6083989) **34** *E. whartoni* sp. nov. ♂ holotype (NMSA-DIP-92011, 75×, https://doi.org/10.5281/zenodo.6084015).

Redescription. Female. ***Head*:** brown, facial gibbosity yellow, in general densely white pubescent, white setose, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex larger than at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin, vertex medially apubescent, laterally white pubescent, white setose; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, white; parafacial area approximately as wide as ½ width of central facial gibbosity (at same level); frons not elevated, medially apubescent, laterally white pubescent, medially asetose, latero-ventrally white; occiput grey pubescent, white setose, median occipital sclerite brown macrosetose; pocl macrosetae absent; postgena sparsely grey pubescent, long, sparsely white setose; clypeus comprised of single sclerite, entirely sclerotized medially, recessed (concave), ventrally simple, posterior to proboscis, laterally connected to face by membranous cuticle; proboscis long, reaching fronto–clypeal suture, brown; labellum large, much wider than prementum, as long as prementum, unsclerotized laterally; maxillary palpus laterally compressed, bilobed apically, light brown, approximately ⅓ length of proboscis.

***Antenna*:** brown; scape white setose dorsally, asetose ventrally; pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal ⅓, symmetrically bulbous in distal 2/3, ≥ 4.0 times as long as combined length of scape and pedicel, asetose; apical seta-like sensory element situated apically in cavity on postpedicel.

***Thorax*:** brown, predominantly grey pubescent; scutum predominantly black, surface microrugose (slightly rugose 'imitating' pubescence), grey pubescent except for brown pubescent broad median stripe (not reaching posterior margin) and sublateral stripes (interrupted by transverse suture), scutal setation comprised of short white setae in primarily grey pubescent areas; dc setae presuturally white, postsuturally absent, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent medially, grey pubescent laterally, long white setose; proepimeron grey pubescent, asetose; antepronotum antero-medially smooth (without any indentation); lateral postpronotum long white setose; postpronotal lobe yellow, grey pubescent, long white setose; scutellum grey pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum grey pubescent, asetose; anatergite grey pubescent, asetose; katatergite apubescent, long white setose, elevated and smoothly convex; anepisternum grey pubescent dorsally, apubescent ventrally, anteriorly asetose, posteriorly short white setose, otherwise asetose; katepisternum apubescent, asetose; anepimeron apubescent, asetose; katepimeron apubescent, asetose; meron grey pubescent dorsally, apubescent ventrally, asetose; metakatepisternum large; metanepisternum grey pubescent, asetose; metepimeron yellow (same color as T1), white pubescent, long white setose, ± flat, infra-halter sclerite absent.

***Legs*:** yellow to brown, setation comprised of white setae and brown macrosetae; pro coxa apubescent, short white setose; mes coxa apubescent, long white setose; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), apubescent, long white setose; met trochanter sparsely setose medially; pro + mes femur yellow anteriorly, posteriorly brown, met femur yellow anteriorly, posteriorly brown, distinctly clubbed for nearly entire length, macrosetose with thickened spine-like macrosetae on protuberance in 2 antero-ventral and 2 postero-ventral rows, postero-ventrally sparse, short white setose; pro tibia straight; mes tibia straight; met tibia laterally arched, met tibia cylindrical with distinct ventral keel terminating into distinct spur, spur almost reaching tip of 1st tarsomere, postero-laterally short white, appressed setose; pro + mes tarsomere 1 approximately as long as individual tarsomeres 2, 3, or 4, met tarsomere 1 as long as individual tarsomeres 2, 3, or 4; pulvillus well-developed, as long as well-developed claw, and as wide as base of claw; setiform empodium absent.

***Wing*:** length = 7.8–10.4 mm; hyaline throughout, slightly brown stained along veins, veins light brown, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with M_1 (or M_1+M_2); Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m indistinct, R_{4+5} and M_1 fused, forming an X; M_1 curves slightly anteriorly at r-m, M_1 (or M_1+M_2) terminates in C; base of M_3+M_4 present, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3 narrow proximally); CuP straight, cell cup wide, CuP

Figures 35–40. *Haplomydas crassipes*: **35** ♂ (NMSA-DIP-77049, Zenodo https://doi.org/10.5281/zenodo.6083941), dorsal (https://doi.org/10.5281/zenodo.6084017) **36** same, lateral (https://doi.org/10.5281/zenodo.6084019) **37** same, head anterior (https://doi.org/10.5281/zenodo.6084021) **38** ♀ (NMSA-DIP-77048, https://doi.org/10.5281/zenodo.6083943), head anterior (https://doi.org/10.5281/zenodo.6084027) **39** same, dorsal (https://doi.org/10.5281/zenodo.6084023) **40** same, lateral (https://doi.org/10.5281/zenodo.6084025). Scale bars: 5 mm.

and wing margin further apart proximally than distally; alula well-developed; halter light yellow, pubescent, dorsally asetose, ventrally yellow setose.

***Abdomen*:** light brown to brown, setation comprised of scattered short white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1

yellow, T2–7 brown (sometimes medially light brown) with yellow posterior margins; T apubescent; T1 long white setose, T2–7 sparsely short white setose; S1 yellow, S2–7 light brown to brown with yellow posterior margins; S apubescent; S1 and S7 short white setose, S2–6 asetose; bullae on T2 absent.

♀ ***abdomen and genitalia*:** densely arranged anteriorly directed setae present on T7–8 and S8, only few on S7; T8 anterior apodeme present, broad and rectangular, auxiliary spiracle present; T9 formed by wide, rectangular sclerite with median protuberance; T9+10 entirely fused (sclerites indistinguishable), T10 divided into 2 heavily sclerotized acanthophorite plates; 6–8 acanthophorite spines per plate; 2 spermathecae, all equally large, not differentiated from spermathecal ducts, unsclerotized; individual spermathecal duct long; S9 (furca) formed by 1 sclerite, ring-like (joined anteriorly and posteriorly), anterior furcal apodeme present, 2 lateral projections forming divided apodeme, lateral furcal apodeme absent, median furcal bridge absent.

Male. ***Head*:** black, facial gibbosity yellow to light brown, in general densely white pubescent, white setose, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex larger than at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin, vertex medially apubescent, laterally white pubescent, white setose; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, white; parafacial area less than ½ width of central facial gibbosity (at same level); frons not elevated, medially apubescent, laterally white pubescent, medially asetose, latero-ventrally white; occiput grey pubescent, white setose, median occipital sclerite brown macrosetose; pocl macrosetae absent; postgena sparsely grey pubescent, long, sparsely white setose; clypeus comprised of single sclerite, entirely sclerotized medially, recessed (concave), ventrally simple, posterior to proboscis, laterally connected to face by membranous cuticle; proboscis long, reaching fronto–clypeal suture, brown; labellum large, much wider than prementum, as long as prementum, unsclerotized laterally; maxillary palpus laterally compressed, bilobed apically, light brown, approximately ⅓ length of proboscis.

***Antenna*:** brown; scape white setose dorsally, asetose ventrally; pedicel white setose dorsally and ventrally; postpedicel cylindrical in proximal ½, symmetrically bulbous in distal ½, ≥ 4.0 times as long as combined length of scape and pedicel, asetose; apical seta-like sensory element situated apically in cavity on postpedicel.

***Thorax*:** dark brown, predominantly grey pubescent; scutum uniformly black, surface microrugose (slightly rugose 'imitating' pubescence), grey pubescent except for brown pubescent broad median stripe (not reaching posterior margin) and sublateral stripes (interrupted by transverse suture), scutal setation comprised of short white setae in primarily grey pubescent areas; dc setae presuturally white, postsuturally absent, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent medially, grey pubescent laterally, long white setose; proepimeron grey pubescent, asetose; antepronotum antero-medially smooth (without any indentation); lateral postpronotum long white setose; postpronotal lobe yellow, grey pubescent, long white setose; scutellum grey pubescent, discal scutellar setae absent,

apical scutellar setae absent; mesopostnotum grey pubescent, asetose; anatergite grey pubescent, asetose; katatergite apubescent, long white setose, elevated and smoothly convex; anepisternum grey pubescent dorsally, apubescent ventrally, anteriorly asetose, posteriorly short white setose, otherwise asetose; katepisternum apubescent, asetose; anepimeron apubescent, long white setose ventrally; katepimeron apubescent, asetose; meron grey pubescent, median stripe apubescent, asetose; metakatepisternum large; metanepisternum grey pubescent, asetose; metepimeron yellow (same color as T1), white pubescent, long white setose, ± flat, infra-halter sclerite absent.

***Legs*:** yellow to brown, setation comprised of white setae and black macrosetae; pro coxa apubescent, short white setose; mes coxa apubescent, long white setose; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), apubescent, long white setose; met trochanter sparsely setose medially; pro + mes femur yellow anteriorly, posteriorly brown, met femur yellow anteriorly, posteriorly brown, distinctly clubbed for nearly entire length, macrosetose with thickened spine-like macrosetae on protuberance in 2 antero-ventral and 2 postero-ventral rows, postero-ventrally sparse, long white erect setose; pro tibia straight; mes tibia straight; met tibia laterally arched, met tibia cylindrical with distinct ventral keel terminating into distinct spur, spur almost reaching tip of 1st tarsomere, postero-laterally short white, appressed setose; pro + mes tarsomere 1 approximately as long as individual tarsomeres 2, 3, or 4, met tarsomere 1 as long as individual tarsomeres 2, 3, or 4; pulvillus well-developed, as long as well-developed claw, and as wide as the base of the claw; setiform empodium absent.

***Wing*:** length = 7.1–7.6 mm; hyaline throughout, slightly brown stained along veins, veins brown, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with M_1 (or M_1+M_2); Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m indistinct, R_{4+5} and M_1 fused, forming an X, rarely distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 curves slightly anteriorly at r-m, M_1 (or M_1+M_2) terminates in C; base of M_3+M_4 present, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3 narrow proximally); CuP straight, cell cup wide, CuP and wing margin further apart proximally than distally; alula well-developed; halter light yellow, pubescent, dorsally asetose, ventrally yellow setose.

***Abdomen*:** yellow to brown, setation comprised of scattered short white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1–7 yellow to orange, T2–7 antero-laterally brown; T apubescent; T1 and anterior ¼ of T2 long white setose, remaining T2 and T3–T7 sparsely white setose laterally; S1–7 yellow, brown medially; S predominantly apubescent; S1–7 sparsely short white setose; bullae on T2 transversely elongate, long (almost occupying entire lateral aspect of tergite), light brown, surface entirely smooth, T2 surface anterior to bullae smooth.

♂ ***abdomen and terminalia*:** T1–7 well-developed, entirely sclerotized, T8 postero-medially weakly sclerotized, with anterior transverse sclerotized bridge connecting lateral sclerites; T7–8 anteriorly with 2 lateral apodemes; T8 auxiliary spiracle present;

S6 regular, without any special setation postero-medially; S8 simple plate, entire (undivided) ventro-medially, not fused to T8 dorso-laterally; epandrium formed by 2 sclerites, separated disto-medially and fused antero-medially, distally in dorsal view blunt with short, strong macrosetae at tip; subepandrial sclerite without lateral or median protuberances; hypandrium concave, cup-shaped, entirely sclerotized ventrally, entirely fused with gonocoxite, forming a gonocoxite-hypandrial complex, supra-hypandrial sclerite absent; gonocoxite simple, long, slightly curved dorsally, with median protuberance, gonocoxal apodeme absent; 2 functional phallic prongs, short and wide, medio-distally connected, parallel or diverging laterally, distally straight or only diverging slightly laterally; phallic epimere absent; lateral ejaculatory process absent; ejaculatory apodeme formed by single dorso-ventrally oriented plate; ventro-median margin of parameral sheath heavily sclerotized (appearing entirely closed); parameral sheath long, sperm sac entirely covered; sperm sac appearing ± heavily sclerotized.

Type locality. Zimbabwe: Bulawayo: Bulawayo (20°09'00"S, 028°35'00"E, -20.15, 28.58333).

Material examined. Botswana: Central: 1♂ Serowe, Farmers Brigade, 22°09'58"S, 026°43'31"E, 1990-04-00, Malaise trap, Forchhammer, P. (AAM-000809, NMSA); 4♂ Serowe, Farmers Brigade, 22°09'58"S, 026°43'31"E, 1987-04-00, Malaise trap, Forchhammer, P. (USNMENT00832025, USNMENT00832027, USNMENT00832028, USNMENT00891896, USNM); 1♀ Serowe, Farmers Brigade, 22°09'58"S, 026°43'31"E, 1987-04-00, Malaise trap, Forchhammer, P. (USNMENT00832026, USNM); Kgatleng: 2♀ Mochudi, 24°25'00"S, 026°08'00"E, 1982-04-19–1982-04-21, Louw, S. (BMSA(D)00087, BMSA(D)00091, BMSA); 4♂ Mochudi, 24°25'00"S, 026°08'00"E, 1982-04-19–1982-04-21, Louw, S. (BMSA(D)00088, BMSA(D)00089, BMSA(D)00090, BMSA(D)00092, BMSA); Mozambique: Gaza: 1♀ Mapai, 22°51'08"S, 031°58'02"E, 1951-05-00, Zumpt, F. (NMSA-DIP-044922, NMSA); Manica: 2♂ Zambéze amont de Tambara (= Nhacolo) Njanassé, Lac Msica, 16°38'21"S, 034°07'28"E, 1929-00-00, Lesne, P. (AAM-001199, AAM-001200, MNHN); 1♂ Inhacoro (= Nhacolo), 16°42'57"S, 034°15'10"E, 1928-05-00, Lesne, P. (Paratype *Heleomydas lesnei*, MNHN); Sofala: 1♂ Nova Chupanga, 17°07'32"S, 034°51'34"E, 0000-05-00, Lesne, P. (Holotype *Heleomydas lesnei*, MNHN); Namibia: Hardap: 2♂ Rehoboth, 9 km S, 23°23'28"S, 017°06'23"E, 1990-03-16, Pulawski, W. (CASENT8380010, CASENT8380011, CAS); 1♂ Rehoboth, 9 km S, 23°23'59"S, 017°04'12"E, 1990-03-16, Schwarz, M. (AAM-000872, Coll. Hauser); Khomas: 2♂ Seeis, 9 km ESE, 20°28'00"S, 017°38'00"E, 1976-03-12, Rozen, J. (AAM-000097, AAM-000098, AMNH); 1♂ Seeis, 22 km ESE, 20°31'00"S, 017°45'00"E, 1976-03-14, Rozen, J. (AAM-000099, AMNH); 1♀ Seeis, 22 km ESE, 20°31'00"S, 017°45'00"E, 1976-03-14, Rozen, J. (AAM-000100, AMNH); 2♀ Windhoek, 26 km N Road 1/6, 22°20'00"S, 017°04'00"E, 1984-03-29, dry stream bed *Acacia* riparian woodland, Londt, J., Stuckenberg, B. (NMSA-DIP-77046, NMSA-DIP-77050, NMSA); 1♂ Windhoek, 26 km N Road 1/6, 22°20'00"S, 017°04'00"E, 1984-03-29, dry stream bed *Acacia*

riparian woodland, Londt, J., Stuckenberg, B. (NMSA-DIP-77047, NMSA); 1♀ Windhoek, 36 km E Road 6/1, 22°30'00"S, 017°22'00"E, 1984-03-17, dry river bed *Acacia* savanna / grassland, Londt, J., Stuckenberg, B. (NMSA-DIP-77048, NMSA); 1♂ Windhoek, 36 km E Road 6/1, 22°30'00"S, 017°22'00"E, 1984-03-17, dry river bed *Acacia* savanna / grassland, Londt, J., Stuckenberg, B. (NMSA-DIP-77049, NMSA); 1♂ Gamsberg, E of pass, 23°20'00"S, 016°20'00"E, 1999-03-12, Gess, F., Gess, S. (AAM-000203, AMGS); Omaheke: 2♀ Witvlei, 22°24'35"S, 018°29'30"E, 1970-03-01, Ross, E. (CASENT8380006, CASENT8380007, CAS); 1♂ Witvlei, 22°24'35"S, 018°29'30"E, 1970-03-01, Ross, E. (CASENT8380008, CASENT8380009, CAS); Otjozondjupa: 1♂ Gross Barmen Resort, 22°06'42"S, 016°44'48"E, 1992-03-19, at night, O'Brian, C., O'Brian, L., Marshall, G. (AAM-009904, CSCA); Zimbabwe: Bulawayo: 1♀ Bulawayo, 20°09'00"S, 028°35'00"E, 1917-05-00, Tucker, R. (SAM-DIP-A007141, Holotype, SAMC); Zimbabwe: 1♂ Worlds View, 18°09'49"S, 032°46'29"E, 1925-04-24, Stevenson, R. (NMSA-DIP-044922, NMSA); 1♂ Bazely Bridge, 19°15'01"S, 032°29'23"E, 1965-04-20, Cookson, D. (NMSA-DIP-031720, NMSA); Matabeleland North: 1♀ Khami Ruins, 20°09'30"S, 028°22'36"E, 1924-04-19, Rhodesia Museum (AAM-000647, NHMUK); 1♂ Khami Ruins, 20°09'30"S, 028°22'36"E, 1924-04-19, Rhodesia Museum (AAM-000648, NHMUK); 1♂ Khami, 20°09'30"S, 028°22'36"E, 1927-04-17, Rhodesia Museum (AAM-009508, NHMW); 1♀ Khami Ruins, 20°09'30"S, 028°22'36"E, 1924-04-19, Rhodesia Museum (NMZ1701, NMBZ); 1♂ Khami, 20°09'30"S, 028°22'36"E, 1927-04-17, Rhodesia Museum (NMZ1707, NMBZ); Matabeleland South: 1♀ Matopos, 20°23'02"S, 028°30'28"E, 1920-05-02, Rhodesia Museum (Holotype *Rhopalia flavomarginata*, BMNH(E)241675, NHMUK); 1♂ Matopos, 20°23'02"S, 028°30'28"E, 1925-04-22, Stevenson, R. (NMSA-DIP-044921, NMSA); 3♀ 6♂ Matopos Hills, 20°26'39"S, 028°30'58"E, 1932-04-00, Ogilvie, L. (AAM-000652–AAM-000660, NHMUK); 1♂ Matopos Hills, 20°26'39"S, 028°30'58"E, 1932-04-00, Ogilvie, L. (AAM-003022, RBINS); 1?* Balla-Balla (= Mbalabala), 20°26'60"S, 029°02'09"E, no date, along sandy path in Mopane forest (AAM-000072, RBINS); 1♀ Balla-Balla (= Mbalabala), 20°26'60"S, 029°02'09"E, 1933-03-00, Cuthbertson, A. (AAM-001357, RBINS); 1♀ 2♂ Balla-Balla (= Mbalabala), 20°26'60"S, 029°02'09"E, 1933-02-00, Cuthbertson, A. (AAM-000095–AAM-000096, AMNH); 1♀ Ori River, Matopos, 20°33'26"S, 028°30'49"E, 1930-05-01, Stevenson, R. (NMZ1709, NMBZ); 3♂ Beit Bridge, 22°12'51"S, 029°59'29"E, 1932-04-00, Ogilvie, L. (AAM-000071, AAM-000649, AAM-000650, NHMUK); 1♀ Beit Bridge, 22°12'51"S, 029°59'29"E, 1932-04-00, Ogilvie, L. (AAM-008033, NHMUK); 1♀ Beit Bridge, 22°12'51"S, 029°59'29"E, 1932-04-00, Ogilvie, J. (SDEI); Midlands: 1♂ Shangani, De Beer's Ranch, 19°00'00"S, 028°54'00"E, 1932-05-00, Ogilvie, L. (AAM-000651, NHMUK).

Distribution, biodiversity hotspots, phenology, and biology. See above for genus.

Remarks. Dikow (2017) reported that the females of *H. crassipes* appear to lack bullae on the postero-lateral surface of abdominal tergite 2.

Lachnocorynus Hesse, 1969

http://zoobank.org/16632F70-15EE-4FF7-8DA7-D2B97BEF5505
Original description online https://www.biodiversitylibrary.org/page/40724405
GBIF https://www.gbif.org/species/1591101

Lachnocorynus Hesse, 1969: 46. Type-species: *Lachnocorynus chobeensis* Hesse, 1969, by original designation.

Diagnosis. The genus can be delineated by the densely setose head, the distinctly and deeply rugose scutum, and the costal vein terminating where M_1 joins the wing margin.

Distribution, biodiversity hotspots, phenology, and biology. Known only from three disjunct localities in northern Namibia, north-eastern Botswana, and north-eastern Zimbabwe (Fig. 56). A rarely collected genus known only from four specimens in museum collections, three collecting events between 1930–1986 (Table 1), and one observation on iNaturalist in 2019 (https://www.inaturalist.org/observations/26760859). The genus is not known to occur in any biodiversity hotspot. Adult flies are active in mid to late winter (Table 2), which corresponds to the dry season and lower temperatures. Nothing is known of the biology.

Lachnocorynus chobeensis Hesse, 1969

http://zoobank.org/2AFB5F72-F10D-4836-A113-EC20704E6EB5
Original description online https://www.biodiversitylibrary.org/page/40724407
GBIF https://www.gbif.org/species/1591103
Figs 41–49, 55, 56

Lachnocorynus kochi Hesse, 1969, syn. nov. ZooBank http://zoobank.org/F341EDA4-F1C6-4B14-8015-F95D23C30BF9. Original description online https://www.biodiversitylibrary.org/page/40724409

Diagnosis. The species is distinguished from congeners by the wide face and vertex (similar width), the entirely apubescent anepimeron, and the sparsely grey pubescent abdominal tergites.

Redescription. Female. ***Head*:** brown, facial gibbosity yellow, in general white pubescent, white setose, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex larger than at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin, vertex white pubescent, white setose; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, white; parafacial area approximately as wide as ¾ width of central gibbosity (at same level); frons not elevated, medially apubescent, laterally white pubescent, white setose; occiput grey pubescent, white setose, median occipital sclerite brown macrosetose; pocl macrosetae absent; postgena sparsely grey pubescent, long, sparsely white setose; clypeus comprised of single sclerite, entirely sclerotized medially,

Figures 41–46. *Lachnocorynus chobeensis*: **41** ♂ holotype (NMSA-Dip-43314, Zenodo https://doi.org/10.5281/zenodo.6083945), dorsal (https://doi.org/10.5281/zenodo.6084029) **42** same, lateral (https://doi.org/10.5281/zenodo.6084031) **43** same, head anterior (https://doi.org/10.5281/zenodo.6084033) **44** ♀ paratype (NMSA-Dip-57787, https://doi.org/10.5281/zenodo.6083949), head anterior (https://doi.org/10.5281/zenodo.6084045) **45** same, dorsal (https://doi.org/10.5281/zenodo.6084041) **46** same, lateral (https://doi.org/10.5281/zenodo.6084043). Scale bars: 5 mm.

recessed (concave), ventrally simple, posterior to proboscis, laterally connected to face by membranous cuticle; proboscis short, nob-like, occupying approximately ⅓ length of oral cavity, light brown; labellum small, as wide as prementum, as long as prementum, unsclerotized laterally; maxillary palpus laterally compressed (triangular), light brown, approximately ½ length of proboscis.

***Antenna*:** brown; scape white setose dorsally, asetose ventrally; pedicel light brown setose dorsally and ventrally; postpedicel cylindrical in proximal ½, symmetrically bulbous in distal ½, ≥ 2.0 times as long as combined length of scape and pedicel, asetose; apical seta-like sensory element situated apically in cavity on postpedicel.

***Thorax*:** black or light brown to black, predominantly white pubescent; scutum black, light brown stripes medially and laterally, surface macrorugose (distinctly and deeply rugose), predominantly apubescent, paramedian stripes (merging on posterior margin) and lateral margins grey pubescent, scutal setation comprised of long white setae in pubescent areas; dc setae pre- and postsuturally white, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent medially, grey pubescent laterally, long white setose; proepimeron grey pubescent, asetose; antepronotum antero-medially smooth (without any indentation); lateral postpronotum long white setose; postpronotal lobe yellow, white pubescent, long white setose; scutellum grey pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum grey pubescent, asetose; anatergite grey pubescent, asetose; katatergite apubescent, long white setose, elevated and smoothly convex; anepisternum white pubescent, anteriorly asetose, posteriorly 1–2 white setae postero-ventrally, otherwise asetose; katepisternum white pubescent dorsally, apubescent ventrally, asetose; anepimeron white pubescent, posterior ½ apubescent, asetose; katepimeron white pubescent, asetose; meron white pubescent, median stripe apubescent, asetose; metakatepisternum large; metanepisternum white pubescent, asetose; metepimeron yellow (same color as T1), white pubescent, long white setose, ± flat, infra-halter sclerite absent.

***Legs*:** light brown to brown, setation comprised of white setae and brown macrosetae; pro coxa sparsely grey pubescent, long white setose; mes coxa sparsely grey pubescent, long white setose; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), sparsely grey pubescent, long white setose; met trochanter setose medially; pro + mes femur light brown to brown, met femur light brown to brown, evenly clubbed in distal ¾, macrosetose, 1 antero-ventral and 1 postero-ventral row of macrosetae, postero-ventrally long white, erect setose with setae arranged in distinct row; pro tibia laterally arched; mes tibia laterally arched; met tibia laterally arched, met tibia cylindrical with distinct ventral keel terminating into distinct spur, postero-laterally sparse long white, erect setose with setae arranged in distinct row; pro + mes tarsomere 1 slightly longer than tarsomere 2, met tarsomere 1 slightly longer than tarsomere 2; pulvillus well-developed, as long as well-developed claw, and as wide as the base of the claw; setiform empodium absent.

***Wing*:** length = 7.4 mm; hyaline throughout, veins light brown, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with M_1 (or M_1+M_2); Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m indistinct, R_{4+5} and M_1 fused, forming an X; M_1 curves slightly anteriorly at r-m, M_1 (or M_1+M_2) terminates in C; base of M_3+M_4 present, M3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3

Figures 47–49. *Lachnocorynus chobeensis* (♂ holotype of *Lachnocorynus kochi*, NMSA-Dip-43304, Zenodo https://doi.org/10.5281/zenodo.6083947): **47** dorsal (https://doi.org/10.5281/zenodo.6084035) **48** lateral (https://doi.org/10.5281/zenodo.6084037) **49** head anterior (https://doi.org/10.5281/zenodo.6084039). Scale bars: 5 mm.

narrow proximally); CuP straight, cell cup wide, CuP and wing margin further apart proximally than distally; alula well-developed; halter light brown, pubescent, dorsally asetose, ventrally yellow setose.

***Abdomen*:** brown, setation comprised of scattered short white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1–3 brown with white posterior margin, T4–7 brown; T apubescent; T1 long white setose, T2–7 short white setose; S1–7 light brown; S apubescent; S1–7 sparsely short yellow setose; bullae on T2 transversely elongate, brown, surface entirely smooth, T2 surface anterior to bullae smooth.

♀ ***abdomen and genitalia*:** densely arranged anteriorly directed setae present on T7–8 and S7–8; T8 anterior apodeme indiscernible (not dissected), auxiliary spiracle indiscernible (not dissected); T9 formed by wide, rectangular sclerite with median protuberance; T9+10 entirely fused (sclerites indistinguishable), T10 divided into 2 heavily sclerotized acanthophorite plates; 5 acanthophorite spines per plate.

Male. *Head*: black, in general grey pubescent, light brown, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex larger than at ventral eye margin; vertex between compound eyes ± horizontally straight, medially only slightly below dorsal eye margin, vertex grey pubescent, white setose; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible

in lateral view, mystax covering entire facial gibbosity, light brown, white ventrally; parafacial area approximately as wide as ¾ width of central gibbosity (at same level); frons not elevated, medially apubescent, laterally grey pubescent, dark brown; occiput grey pubescent, white setose, median occipital sclerite brown macrosetose; pocl macrosetae absent; postgena sparsely grey pubescent, long, sparsely light brown setose; clypeus comprised of single sclerite, entirely sclerotized medially, recessed (concave), ventrally simple, posterior to proboscis, laterally connected to face by membranous cuticle; proboscis short, nob-like, occupying approximately ⅓ length of oral cavity, brown; labellum small, as wide as prementum, as long as prementum, unsclerotized laterally; maxillary palpus laterally compressed (triangular), brown, approximately ½ length of proboscis.

***Antenna*:** brown; scape white setose dorsally, asetose ventrally; pedicel light brown setose dorsally and ventrally; postpedicel cylindrical in proximal ½, symmetrically bulbous in distal ½, ≥ 3.0 times as long as combined length of scape and pedicel, asetose; apical seta-like sensory element situated apically in cavity on postpedicel.

***Thorax*:** black or brown, predominantly grey pubescent; scutum uniformly black, surface macrorugose (distinctly and deeply rugose), predominantly apubescent, paramedian stripes (merging on posterior margin) and lateral margins grey pubescent, scutal setation comprised of long white to yellow setae in pubescent areas; dc setae pre- and postsuturally white, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent medially, grey pubescent laterally, long white setose; proepimeron grey pubescent, asetose; antepronotum antero-medially smooth (without any indentation); lateral postpronotum long white setose; postpronotal lobe light brown, grey pubescent, long white setose; scutellum grey pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum grey pubescent, asetose; anatergite grey pubescent, asetose; katatergite apubescent, long white setose, elevated and smoothly convex; anepisternum sparsely grey pubescent, anteriorly asetose, posteriorly asetose, otherwise asetose; katepisternum dorsally sparsely grey pubescent, asetose; anepimeron apubescent, asetose; katepimeron sparsely grey pubescent, asetose; meron apubescent, asetose; metakatepisternum large; metanepisternum grey pubescent, asetose; metepimeron brown (same color as T1), grey pubescent, long white setose, ± flat, infra-halter sclerite absent.

***Legs*:** brown, setation comprised of white setae and brown macrosetae; pro coxa sparsely grey pubescent, long white setose; mes coxa sparsely grey pubescent, long white setose; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), sparsely grey pubescent, long white setose; met trochanter setose medially; pro + mes femur brown, met femur brown, evenly clubbed in distal ¾, macrosetose, 1 antero-ventral and 1 postero-ventral row of macrosetae, postero-ventrally long white, erect setose with setae arranged in distinct row; pro tibia laterally arched; mes tibia laterally arched; met tibia laterally arched, met tibia cylindrical with distinct ventral keel terminating into distinct spur, postero-laterally sparse long white, erect setose with setae arranged in distinct row; pro + mes tarsomere 1 slightly longer than tarsomere 2, met tarsomere 1 slightly longer than tarsomere 2; pulvillus well-developed, as long as well-developed claw, and as wide as the base of the claw; setiform empodium absent.

***Wing*:** length = 6.0 mm; hyaline throughout, veins light brown, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with M_1 (or

M_1+M_2); Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1; auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m indistinct, R_{4+5} and M_1 fused, forming an X; M_1 curves slightly anteriorly at r-m, M_1 (or M_1+M_2) terminates in C; base of M_3+M_4 present, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3 narrow proximally); CuP straight, cell cup wide, CuP and wing margin further apart proximally than distally; alula well-developed; halter light brown, pubescent, dorsally asetose, ventrally yellow setose.

***Abdomen*:** brown, setation comprised of scattered short white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1 brown, T2–6 brown with white posterior margin, T7 brown; T sparsely grey pubescent; T1–2 long white setose, T3–7 short white setose; S1–6 light brown, S7 brown; S1–3 apubescent, S4–7 sparsely grey pubescent; S1–7 short white setose; bullae on T2 transversely elongate, light brown, surface entirely smooth, T2 surface anterior to bullae smooth.

♂ ***abdomen and terminalia*:** not dissected.

Type locality. Botswana: Chobe: Kabulabula, Chobe river (17°48'41"S, 024°56'48"E, -17.81139, 24.94667).

Material examined. Botswana: Chobe: 1♂ Kabulabula, Chobe river, 17°48'41"S, 024°56'48"E, 1930-07-11–1930-07-24, Vernay-Lang Kalahari Expedition (NMSA-DIP-43314, Holotype, NMSA); 1♀ Kabulabula, Chobe river, 17°48'41"S, 024°56'48"E, 1930-07-11–1930-07-24, Vernay-Lang Kalahari Expedition (NMSA-DIP-57787, Paratype, NMSA); Namibia: Ohangwena: 1♂ Oshikango, 17°24'00"S, 015°53'00"E, 1948-07-00, Koch, C. (NMSA-DIP-43304, Holotype *Lachnocorynus kochi*, NMSA).

Observations at iNaturalist. Botswana: Ngamiland: 18°57'56"S, 22°56'32"E, 2019-06-10, Taylor, R. (record URL www.inaturalist.org/observations/26760859).

Distribution, biodiversity hotspots, phenology, and biology. Known only from three localities in northern Botswana and north-central Namibia (Fig. 56). A rarely collected species known only from three specimens and two collecting events in 1930 and 1948 and one observation in 2019 (Table 1). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in June–July in mid winter (Table 2), which corresponds to the dry season and lower temperatures (data for Kasane, Botswana, see https://worldweather.wmo.int/en/city.html?cityId=1545 and Oshikango, Namibia, see https://www.worldweatheronline.com/oshikango-weather-averages/ohangwena/na.aspx). Nothing is known of the biology.

Remarks. The male holotype of *L. kochi* is not well-preserved (Figs 47–49) and it cannot in any meaningful way be distinguished from *L. chobeensis*. The only differences of the male holotypes pertain to the abdominal colouration (T1 and T7 entirely brown in *L. chobeensis* and all tergites with yellow posterior margins in *L. kochi*). The male terminalia were not dissected but are morphologically very similar based on the externally visible structures. These minute differences in colouration cannot be utilized to delineate species and we, therefore, synonymize the two species. Both species were described by Hesse (1969) and he designated *L. chobeensis* as the type species of the genus. We, therefore, assign *L. chobeensis* as the senior synonym and this species has also been collected in both the female and male sex during the same collecting event.

***Lachnocorynus stenocephalus* sp. nov.**
http://zoobank.org/42B6D785-DD4A-4B33-951F-D18E986D00C4
GBIF https://www.gbif.org/species/1591101 (genus record)
Figs 50–52, 56

Diagnosis. The species is distinguished from congeners by the very narrow face (vertex much wider than face), the medially apubescent anepimeron (grey pubescent dorsally and ventrally), the apubescent katepimeron, and the apubescent abdominal tergites.

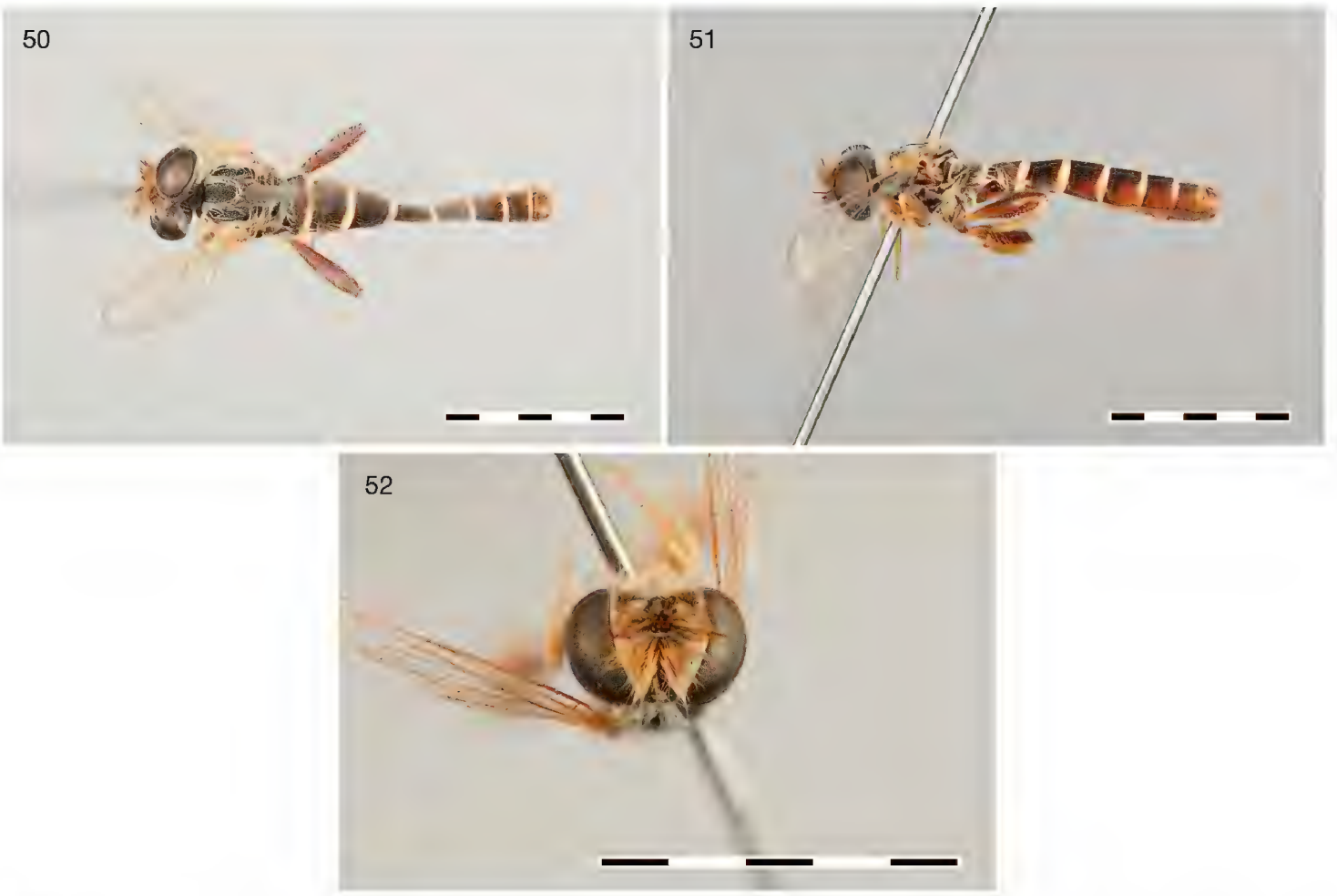
Etymology. Greek *steno* = narrow, *cephalos* = head. The specific epithet refers to the very narrow ventral face of this species.

Description. Female. unknown.

Male. ***Head*:** black, facial gibbosity brown, in general grey pubescent, white and light brown, regular, cylindrical setae; width distinctly greater than thorax (at postpronotal lobe), interocular distance on vertex distinctly larger than at ventral eye margin; vertex between compound eyes slightly depressed (less than 60° angle on median eye margin), vertex predominantly apubescent, only lateral margin grey pubescent, white setose; ocellar triangle apubescent; facial gibbosity distinct, well-developed and discernible in lateral view, mystax covering entire facial gibbosity, light brown, white ventrally; parafacial area approximately as wide as ½ width of central facial gibbosity (at same level); frons not elevated, medially apubescent, laterally grey pubescent, medially asetose, latero-ventrally brown; occiput grey pubescent, white setose, median occipital sclerite light brown macrosetose; pocl macrosetae absent; postgena sparsely grey pubescent, long, sparsely white setose; clypeus comprised of single sclerite, entirely sclerotized medially, recessed (concave), ventrally simple, posterior to proboscis, laterally connected to face by membranous cuticle; proboscis short, nob-like, occupying approximately ⅓ length of oral cavity, light brown; labellum small, as wide as prementum, as long as prementum, unsclerotized laterally; maxillary palpus cylindrical, light brown, longer than ½ length of proboscis.

***Antenna*:** brown; scape asetose; pedicel white setose dorsally and ventrally; postpedicel indiscernible (broken).

***Thorax*:** black, predominantly grey pubescent; scutum uniformly black, surface macrorugose (distinctly and deeply rugose), predominantly apubescent, paramedian stripes (merging on posterior margin) grey to light brown pubescent and lateral margins grey pubescent, scutal setation comprised of long white to yellow setae in pubescent areas; dc setae pre- and postsuturally white or yellow, acr setae absent, lateral scutal setae white, npl setae 0, spal setae 0, pal setae 0; proepisternum apubescent medially, grey pubescent laterally, long white setose; proepimeron grey pubescent, asetose; antepronotum antero-medially smooth (without any indentation); lateral postpronotum long white setose; postpronotal lobe yellow, grey pubescent, long white setose; scutellum sparsely grey pubescent, discal scutellar setae absent, apical scutellar setae absent; mesopostnotum partly grey pubescent, asetose; anatergite grey pubescent, asetose; katatergite apubescent, long white setose, slightly elevated, smoothly convex; anepisternum grey pubescent, anteriorly asetose, posteriorly asetose, otherwise asetose; katepisternum dorsally grey pubescent, ventrally apubescent, asetose; anepimeron dorsally

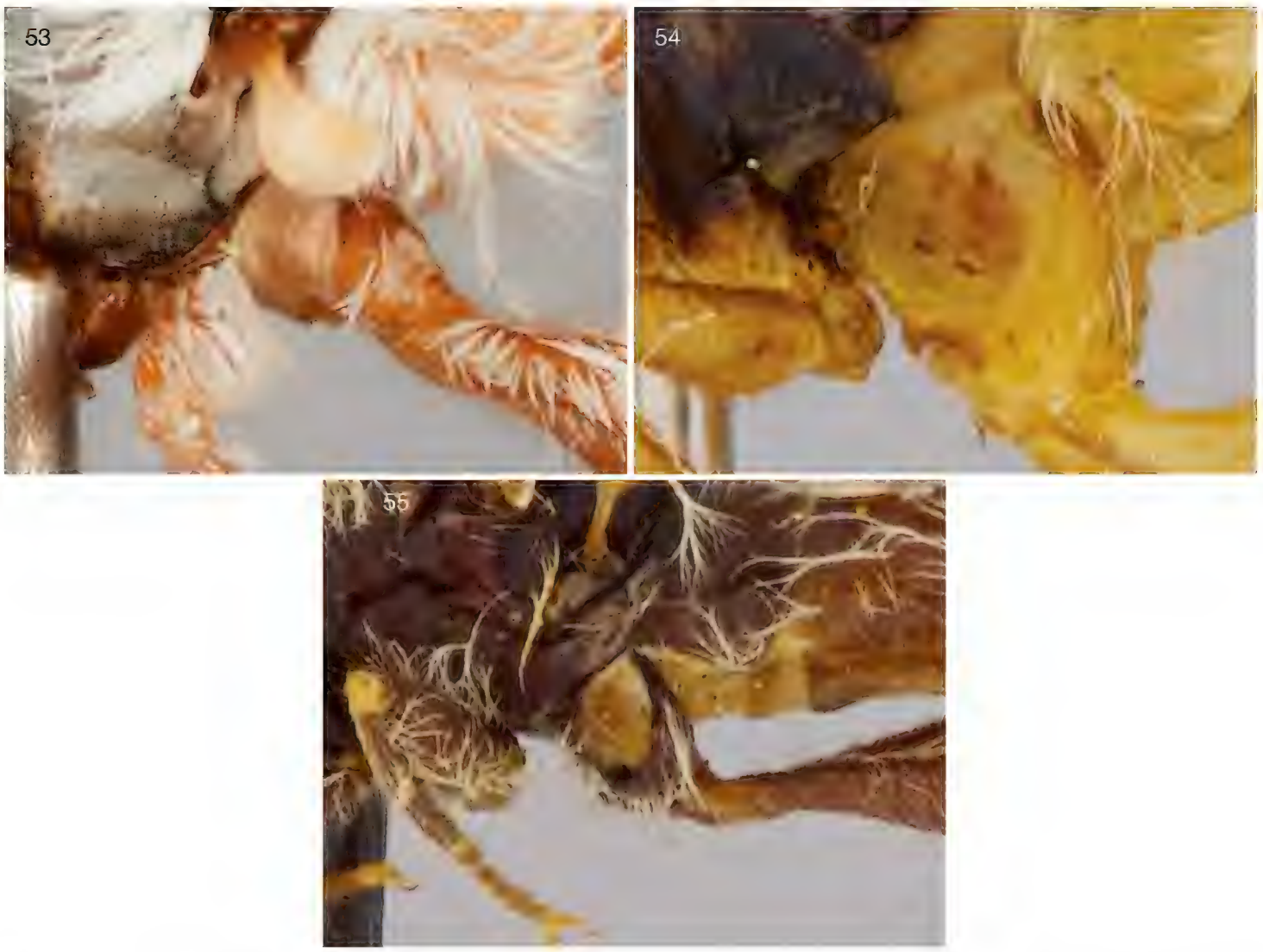


Figures 50–52. *Lachnocorynus stenocephalus* sp. nov. ♂ holotype (AAM-003060, Zenodo https://doi.org/10.5281/zenodo.6083951): **50** dorsal (https://doi.org/10.5281/zenodo.6084047) **51** lateral (https://doi.org/10.5281/zenodo.6084049) **52** head anterior (https://doi.org/10.5281/zenodo.6084051). Scale bars: 5 mm.

and ventrally grey pubescent, median stripe apubescent, asetose; katepimeron apubescent, asetose; meron grey pubescent, median stripe apubescent or white pubescent, median stripe apubescent, asetose; metakatepisternum large; metanepisternum grey pubescent, asetose; metepimeron brown (same color as T1), sparsely grey pubescent, long white setose, ± flat, infra-halter sclerite absent.

***Legs*:** yellow to brown, setation comprised of white setae and brown macrosetae; pro coxa sparsely grey pubescent, long white setose; mes coxa sparsely grey pubescent, long white setose; met coxa laterally unsclerotized (membrane between coxa and metakatepisternum clearly visible), sparsely grey pubescent, long white setose; met trochanter setose medially; pro + mes femur yellow, met femur brown, evenly clubbed in distal ¾, macrosetose, 1 antero-ventral and 1 postero-ventral row of macrosetae, 2 macrosetae anteriorly distally, postero-ventrally sparse, long white erect setose; pro tibia straight; mes tibia straight; met tibia laterally arched, met tibia cylindrical with distinct ventral keel terminating into distinct spur, postero-laterally short white, appressed setose; pro + mes tarsomere 1 approximately as long as individual tarsomeres 2, 3, or 4, met tarsomere 1 as long as individual tarsomeres 2, 3, or 4; pulvillus well-developed on pro and mes legs, smaller on met legs; setiform empodium absent.

***Wing*:** length = 5.7 mm; hyaline throughout, veins yellow, microtrichia absent; cells r_1, r_4, m_3, + cua closed, r_5 open; C terminating at junction with M_1 (or M_1+M_2); Sc long, terminating in C proximal to r-m; R_4 terminates in R_1; R_5 terminates in R_1;



Figures 53–55. Metathoracic coxa in lateral view: **53** *Eremohaplomydas gobabebensis* sp. nov. (USNMENT01518012, crop of Fig. 11) **54** *Haplomydas crassipes* (NMSA-DIP-77049, crop Fig. 36) **55** *Lachnocorynus chobeensis* (NMSA-Dip-43314, crop of Fig. 42).

auxiliary vein (R_3) at base of R_4 absent; R_4 and R_5 widest apart medially; r-m distinct, R_{4+5} and M_1 apart, connected by crossvein; M_1 curves slightly anteriorly at r-m, M_1 (or M_1+M_2) terminates in C; base of M_3+M_4 present, M_3+M_4 not terminating together in C (not reaching wing margin), M_4 and CuA split proximally to m-cu (cell m_3 narrow proximally); CuP straight, cell cup wide, CuP and wing margin further apart proximally than distally; alula well-developed; halter light yellow, pubescent, asetose.

***Abdomen*:** brown, setation comprised of scattered short white setae, T2–4 parallel-sided and not constricted waist-like, T surface entirely smooth; T1–7 dark brown dorsally, brown laterally, posterior margins yellowish; T apubescent; T1–2 long white setose, T3–7 short white setose; S1–5 yellow with white posterior margins, S6–8 light brown; S apubescent; S1 asetose, S2–7 sparsely white setose; bullae on T2 transversely elongate, light brown, surface entirely smooth, T2 surface anterior to bullae smooth.

♂ ***abdomen and terminalia*:** T1–7 well-developed, entirely sclerotized, T8 postero-medially weakly sclerotized, with anterior transverse sclerotized bridge connecting lateral sclerites. ♂ terminalia not dissected.

Type locality. Zimbabwe: Mashonaland East: Kotwa, Chimana Causeway (17°06'00"S, 032°38'00"E, -17.1, 32.63333).

Material examined. Zimbabwe: Mashonaland East: 1♂ Kotwa, Chimana Causeway, 17°06'00"S, 032°38'00"E, 1986-08-05, Lillig, M., Potel, S. (AAM-003060, Holotype, SNSB-ZSM).

Distribution, biodiversity hotspots, phenology, and biology. Known only from the type locality in north-eastern Zimbabwe (Fig. 56). A rarely collected species known only from a single specimen and collecting event in 1986 (Table 1). The species is not known to occur in any currently recognized biodiversity hotspot. Adult flies are active in late winter (Table 2), which corresponds to the dry season and lower temperatures (data for Mount Darwin, Zimbabwe, see https://worldweather.wmo.int/en/city.html?cityId=956). Nothing is known of the biology.

Key to species of *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus*

An online, illustrated version of the below dichotomous key is available at https://keys.lucidcentral.org/keys/v4/eremohaplomydas-dichotomous. An online, illustrated matrix-based, multi-access key is available at http://keys.lucidcentral.org/keys/v4/eremohaplomydas-matrix.

1 Proboscis distinct and long, almost reaching fronto-clypeal suture; widespread in southern Africa (Fig. 2) ..... ***Haplomydas crassipes***

– Proboscis short or minute, clearly not reaching fronto-clypeal suture; restricted geographically (see Fig. 2) **2**

2 Proboscis very small or minute (Figs 31–34); C terminating at R_1 (Fig. 10); pro and mes coxae anteriorly with either macrosetae or dorso-ventrally flattened setae; clypeus connected to face laterally by sclerotized cuticle; scutum surface smooth or only microrugose (slightly rugose 'imitating' pubescence) **4**

– Proboscis short and knob-like but easily discernible, occupying approximately 1/3 of oral cavity (Fig. 43); C terminating at M_1 (Figs 42, 46); pro and mes coxae anteriorly with only regular setae; clypeus connected to face laterally by membranous cuticle; scutum distinctly macrorugose (distinctly and deeply rugose) **3**

3 Interocular distance on vertex distinctly larger than at ventral eye margin, face ventrally very narrow (only males known, Fig. 52); mystax predominantly light brown (white dorsally); in males parafacial area approximately as wide as 1/2 width of central facial gibbosity; north-eastern Zimbabwe ..... ***Lachnocorynus stenocephalus* sp. nov.**

– Interocular distance on vertex only slightly larger than at ventral eye margin (Fig. 49); mystax predominantly white (brown dorsally); in males parafacial area approximately as wide as 3/4 width of central gibbosity; northern Botswana and north-central Namibia ..... ***Lachnocorynus chobeensis***

4 Alula well-developed; cell r_4 closed with R_4 and R_5 terminating together in R_1; anepisternum setose anteriorly and posteriorly; anepimeron setose **6**

– Alula entirely reduced; cell r_4 closed with R_4 and R_5 terminating independently in R_1; anepisternum asetose; anepimeron asetose **5**

5 Females with T3–8 apubescent, T1 entirely pubescent, T2 medially pubescent (Fig. 4); males with single macroseta on katepimeron (females asetose); larger flies with wing length 7.7–9.9 mm (1 male 5.6 mm); distributed in northern Namib desert (Fig. 56) ..... ***Eremohaplomydas desertorum***

– Females with T5–8 apubescent, T1–3 entirely pubescent, T4 medially pubescent (Fig. 23); katepimeron asetose in females and males; generally smaller flies with wing length 5–8 mm; distributed in central Namib desert (Fig. 57) ..... ***Eremohaplomydas whartoni* sp. nov.**

6 All occipital setae setose only; base of vein M_3+M_4 absent (irregular wing venation); scutum entirely densely golden pubescent; distributed in central Namib desert (Fig. 56); females unknown ..... ***Eremohaplomydas gobabebensis* sp. nov.**

– Dorso-median occipital setae macrosetose; base of vein M_3+M_4 present (regular wing venation); scutum grey pubescent with broad median and 2 sublateral stripes brown pubescent; distributed in northern Namib desert (Fig. 57); males unknown ..... ***Eremohaplomydas stomachoris* sp. nov.**

Key to genera of Afrotropical Mydidae

The present review of the genera *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* revealed character state combinations that would prevent them from being properly identified using the key by Dikow (2017). For example, the posterior margin of the anepisternum being setose (couplet 6 in Dikow 2017) separates *Haplomydas* from most other Afrotropical Syllegomydinae (including *Eremohaplomydas* and *Lachnocorynus* in that key), but both *E. gobabebensis* sp. nov. and *E. stomachoris* sp. nov. are setose as well. Therefore, an updated key to the genera of the Afrotropical Region is necessary and provided here.

The online, illustrated version of the 2017 key has been updated and is available at https://keys.lucidcentral.org/keys/v4/Afrotropical-Mydidae-genera-dichotomous (version 2, 2022).

1 Antennal postpedicel composed of a single clubbed segment; mystacal (facial) setae absent ..... ***Tongamya***

– Antennal postpedicel composed of a cylindrical proximal part and bulbous distal part separated by membranous cuticle; mystacal (facial) setae present **2**

2 Katatergite setose (at least a few short setae present, often densely setose) **6**

– Katatergite asetose **3**

3 Cell r_4 open; M_3+M_4 absent (not terminating together into C) (Rhopaliinae) ... **5**

– Cell r_4 closed; M_3+M_4 present (terminating together into C) (Ectyphinae) **4**

4 Auxiliary vein (R_3) connecting R_4 and R_2; anatergite setose; posterior margin of anepisternum setose ..... ***Parectyphus***

– Auxiliary vein (R_3) extending from R_4 as a short stump vein, but not reaching R_2; anatergite asetose; posterior margin of anepisternum asetose ..... ***Ectyphus***

5 Proboscis long (extending beyond fronto-clypeal suture); cylindrical proximal part of postpedicel long, longer than bulbous distal part, this is more or less cylindrical; vertex slightly below median compound eye margin.....***Rhopalia***

– Proboscis minute; cylindrical proximal part of postpedicel short, much shorter than bulbous distal part, this proximally expanded and narrower distally; vertex elevated above median compound eye margin .....***Perissocerus***

6 Metathoracic coxa barrel-shaped, connected to metakatepisternum by 1 lateral and 1 median articulation point, membranous area between metakatepisternum and met coxa narrow **9**

– Metathoracic coxa not barrel-shaped, connected to metakatepisternum by 2 lateral articulation points, membranous area between metakatepisternum and met coxa large, easily visible in lateral view.....7

7 Proboscis distinct and long, almost reaching fronto-clypeal suture; females without bullae on postero-lateral margin of T2 .....***Haplomydas***

– Proboscis short or minute, clearly not reaching fronto-clypeal suture; females with bullae (even if small) easily discernible on postero-lateral margin of T2....**8**

8 Proboscis very small or minute; C terminating at R_1; pro and mes coxae anteriorly with either macrosetae or dorso-ventrally flattened setae; clypeus connected to face laterally by sclerotized cuticle; scutum surface smooth or only microrugose (slightly rugose 'imitating' pubescence)..... ***Eremohaplomydas***

– Proboscis short and nob-like but easily discernible, occupying approximately 1/3 of oral cavity; C terminating at M_1; pro and mes coxae anteriorly with only regular setae; clypeus connected to face laterally by membranous cuticle; scutum distinctly macrorugose (distinctly and deeply rugose) ..... ***Lachnocorynus***

9 Posterior margin of anepisternum asetose.....**18**

– Posterior margin of anepisternum setose (at least a few setae present, e.g., in *Oreomydas*, often densely setose) **10**

10 Mediotergite (mesopostnotum) asetose **12**

– Mediotergite (mesopostnotum) setose, at least laterally, usually also medially.....**11**

11 Proboscis minute to short, but never projecting beyond fronto-clypeal suture; cell r_5 (usually) closed; widespread sub-Saharan Africa with few species in southern Africa .....***Syllegomydas***

– Proboscis long to very long, invariably projecting beyond fronto-clypeal suture; cell r_5 open (even if only narrowly so); restricted to southern Africa, including southern Angola and southern Zambia .....***Afroleptomydas***

12 Infra-halter sclerite present and setose (Dikow and Leon 2014, p. 35); male with 2 phallic prongs fused medially .....***Namadytes***

– Infra-halter sclerite absent; male with 2 phallic prongs invariably separated medially.....**13**

13 Anatergite asetose **15**

– Anatergite setose **14**

14 Metathoracic femur cylindrical, not expanded distally; posterior margin of anepisternum densely setose; larger flies (wing length 11.2–17.7 mm) ..... ***Namibimydas***

– Metathoracic femur distinctly expanded distally; posterior margin of anepisternum only sparsely setose (1–4 setae); smaller flies (wing length 7.8–8.9 mm) ... ***Oreomydas***

15 Proboscis very long, projecting beyond tip of antennal postpedicel ..... ***Nothomydas***

– Proboscis long, projecting beyond fronto-clypeal suture, but never beyond tip of antennal postpedicel **16**

16 Abdominal tergal setae with small alveoli only, surface not punctate; scutum smooth ..... ***Heteroleptomydas / Nomoneuroides***

– Abdominal tergal setae with large, distinct alveoli, giving surface punctate appearance; scutum rugose..... **17**

17 Frons setose medially (at least few setae present, directly anterior to anterior ocellus); posterior margin of anepisternum only sparsely setose dorsally; restricted to easternmost South Africa and southernmost Mozambique ..... ***Neolaparopsis***

– Frons asetose medially (directly anterior to anterior ocellus); posterior margin of anepisternum densely setose from dorsal to ventral margin; restricted to northern Somalia ..... ***Afromydas***

18 Base of M_4 and middle section of CuA separated by m-cu (m-cu connecting M_3+M_4 and CuA); cell m_3 narrow proximally **20**

– Base of M_4 and middle section of CuA fused for considerable distance (m-cu absent, base of M_4 connecting M_3+M_4 and CuA); cell m_3 broad proximally ... **19**

19 Proboscis long, invariably extending well beyond fronto-clypeal suture, often projecting beyond tip of antennal postpedicel; anatergite asetose; metathoracic tibia with ventral keel at least proximally; commonly collected, but restricted to southern Namibia and Eastern, Northern, and Western Cape Provinces of South Africa ..... ***Cephalocera***

– Proboscis short, usually minute, except in a single species extending just beyond fronto-clypeal suture; anatergite setose; metathoracic tibia entirely cylindrical; rarely collected, but widely distributed throughout southern Africa ..... ***Cephalocerodes***

20 Proboscis long, invariably projecting beyond fronto-clypeal suture **25**

– Proboscis minute to short, but never projecting beyond fronto-clypeal suture..... **21**

21 Scutellum with 2 lateral tufts of discal scutellar setae ..... ***Halterorchis / Mimadelphus***

– Scutellum without any discal scutellar setae **22**

22 Parafacial area (between tentorial pit and median eye margin) more than 1/2 width of central facial swelling (at same level) (more pronounced in females);

light brown, grey pubescent, mostly asetose flies; restricted to southern Arabian Peninsula ..... ***Eremomidas***

– Parafacial area less than 1/2 width of central facial swelling; restricted to sub-Saharan Africa or Madagascar **23**

23 Cell d closed with long stalk (M_1 and M_3 merging before reaching r-m); auxiliary vein (R_3) on R_4 absent; restricted to Madagascar ..... ***Mahafalymydas***

– Cell d closed bluntly (M_1 and M_3 merging beyond r-m); auxiliary vein (R_3) on R_4 present; restricted to sub-Saharan Africa..... **24**

24 Median surface of metathoracic tibia with long, erect setae; metathoracic femur without ventral macrosetae; proboscis very short, only extending halfway to fronto-clypeal suture; restricted to north-westernmost Namibia..... ***Notosyllegomydas***

– Median surface of metathoracic tibia without long, erect setae; metathoracic femur with ventral macrosetae on elevated alveoli; proboscis short, but extending to fronto-clypeal suture; restricted to Kenya and Tanzania ..... ***Mydaselpis ngurumani***

25 Anepimeron and katepimeron asetose..... **27**

– Anepimeron and katepimeron setose (Leptomydinae in part) **26**

26 Restricted to Madagascar ..... ***Hessemydas***

– Restricted to Sudan..... ***Leptomydas***

27 Surface of abdominal tergites smooth (setae on tergites without obvious alveoli); T10 in females with acanthophorite spines..... **29**

– Surface of abdominal tergites punctate (setae on tergites with distinct alveoli); T10 in females without acanthophorite spines..... **28**

28 Male with phallic epimere (*sensu* Hesse 1969: 36) absent; restricted to southern Africa..... ***Mydaselpis***

– Male with phallic epimere distally simple and evenly rounded; throughout sub-Saharan Africa (within southern Africa only in Zimbabwe and northern South Africa) ..... ***Vespiodes***

29 Scutum rugose (except postalar callus); abdomen broad proximally and tapering slightly distally ..... ***Arenomydas***

– Scutum smooth throughout, sometimes slightly punctate medially and paramedially; abdomen parallel-sided throughout **30**

30 Katatergite, antero-lateral scutum, and T1 densely long setose (females unknown); alula large, medially overlapping with scutellum (when wings folded over abdomen); frons and vertex densely long setose; restricted to southern Namibia and north-western South Africa..... ***Agaperemius***

– Katatergite, antero-lateral scutum, and T1 sparsely short setose in females and males; alula well-developed, but medially not touching scutellum (when wings folded over abdomen); frons and vertex sparsely short setose (virtually bare); restricted to eastern and southern South Africa ..... ***Nomoneura***

Discussion

Placement in Syllegomydinae

Hesse (1969), Bowden (1980), and Dikow (2017) place *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* in the Syllegomydinae. This taxon was proposed by Bequaert (1963) in a review of the Afrotropical Mydidae to group those species with a two-pronged phallus and the absence of a joint M_3+M_4 vein reaching C on the posterior wing margin. Interestingly, the males of *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* exhibit on first sight a single-pronged phallus, which is found in all Mydidae species, with the exception of Syllegomydinae, and their sister-group Apioceridae (Dikow 2009). Only a detailed study through dissections reveals that the phallus of the three genera is actually two-pronged. In the majority of Syllegomydinae species, the phallus has two distinct prongs arranged parallel to each other with openings for sperm deposition and an unpaired dorsal epimere. This configuration is most evident in species of *Afroleptomydas* and *Syllegomydas*. In *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus*, however, the two phallic prongs appear to be fused medially entirely and do not show distinctly visible openings for sperm deposition. The illustration of the posterior view of the male terminalia of *Lachnocorynus chobeensis* in Hesse (1969, see his Fig. 5, www.biodiversitylibrary.org/page/40724748) appears to show a single-pronged phallus. Our hypothesis is that there are two phallic prongs, which are fused medially and difficult to characterize individually. Entirely fused phallic prongs are also found in *Namadytes* Hesse, 1969 (Hesse 1972, see his Fig. 3 www.biodiversitylibrary.org/page/40942083, Dikow and Leon 2014), but the openings are distinctly visible providing evidence that there are two independent phallic prongs.

The wing venation in *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* exhibits general features of other, but not all, Syllegomydinae genera (cell r_4 closed, cell r_5 open, C terminating anterior to wing tip at R_1 or M_{1+2}, and M_3+M_4 not joining and terminating together into C).

While Bequaert (1963) included *Haplomydas* in his Syllegomydinae (despite postulating a single-pronged phallus), he explicitly excluded *Eremohaplomydas*, which he had described a few years earlier including illustrations of the male terminalia (Bequaert 1959), *Halterorchis* Bezzi, 1924 (males have only been reported recently, Dikow 2017), and *Eremomidas* Semenov, 1896 (now considered a Leptomydinae, but see discussion by Dikow 2017).

To date, representatives of five subfamilies of Mydidae are known from the Afrotropical Region, *i.e.*, Ectyphinae (2 genera, Lyons and Dikow 2010), Leptomydinae (3, see Dikow 2017), Megascelinae (1, Stuckenberg 1966; Yeates and Irwin 1996), Rhopaliinae (2, see Dikow 2017) and Syllegomydinae (24). Based on wing venation alone, *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* cannot be placed in Ectyphinae, Megascelinae, and Rhopaliinae. The Leptomydinae fauna of the Afrotropical Region as currently understood is restricted to the Arabian Peninsula, the north-eastern Afrotropics and Madagascar (see Dikow 2017). We follow the hypotheses put forward by Hesse (1969) that all three genera should be placed in the Syllegomydinae. Morphological

and molecular phylogenetic studies of the entire Mydidae are currently being prepared by the junior author and these hypotheses will shed light on the evolutionary relationships of *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus*.

Distribution of the three genera

Eremohaplomydas is one of only two Mydidae genera known to be endemic to the Namib Desert (the other one is *Notosyllegomydas* Hesse, 1969 with a single species known from the northern Namib desert). *Eremohaplomydas* is known from two areas (with two collecting localities each) in the northern and central Namib Desert (Fig. 3).

Haplomydas is a widespread genus recorded here from some 67 specimens from 25 collecting events (Table 1) throughout southern Africa (Fig. 3). It is interesting to note though that *Haplomydas* has not been recorded from South Africa even though this country is the best sampled region of southern Africa and shares similar habitats with its neighbors Namibia, Botswana, Zimbabwe, and Mozambique along its northern and eastern borders. In addition, South Africa has the highest diversity of genera and species of Mydidae recorded within southern Africa (19 genera and 135 species) followed by Namibia (11 and 32), Zimbabwe (8 and 15), Mozambique (7 and 11), and Botswana (4 and 5, numbers include new species described herein). Several localities of *Haplomydas crassipes* in Botswana (Mochudi), Mozambique (Mapai), and Zimbabwe (Beit Bridge) are situated very close to the South African border (Fig. 3) supporting the hypothesis that it might only be a matter of time until this species will also be recorded from South Africa in similar habitats.

Lachnocorynus is known from four distant localities along the 17 degree southern latitude from northern Namibia, northern Botswana, and north-eastern Zimbabwe (Fig. 3). While the genus is currently restricted to southern Africa, one can postulate that it will also occur in Angola, Zambia, and Mozambique and potentially even further north.

Species pairs of *Eremohaplomydas*

It is interesting to observe that the four known species of *Eremohaplomydas* group together both geographically and morphologically in pairs. *E. desertorum* and *E. stomachoris* sp. nov. occur in the vicinity of Orupembe in north-western Namibia (Figs 56–57) while *E. gobabebensis* sp. nov. and *E. whartoni* sp. nov. occur in the vicinity of Gobabeb in west-central Namibia (Figs 56–57). The distance between these two sites is more than 600 km as the crow flies. Species within each pair appear to be isolated by different seasonal imago flight activity periods though as imagines of *E. desertorum* and *E. stomachoris* sp. nov. fly in early June and early May, respectively, and imagines of *E. gobabebensis* sp. nov. and *E. whartoni* sp. nov. fly in November and May, respectively (Table 2).

More striking is the morphological similarity of species pairs, which is opposite to that of the geographical pairs. *E. gobabebensis* sp. nov. and *E. stomachoris* sp. nov. imagines (Figs 10–12, 16–18) are very small and slender, have less expanded metathoracic femora, R_5 terminates in R_1 and R_4 simultaneously, and the alula is well-developed. In contrast, *E. desertorum* and *E. whartoni* sp. nov. (Figs 4–9, 19–24) are larger flies, have

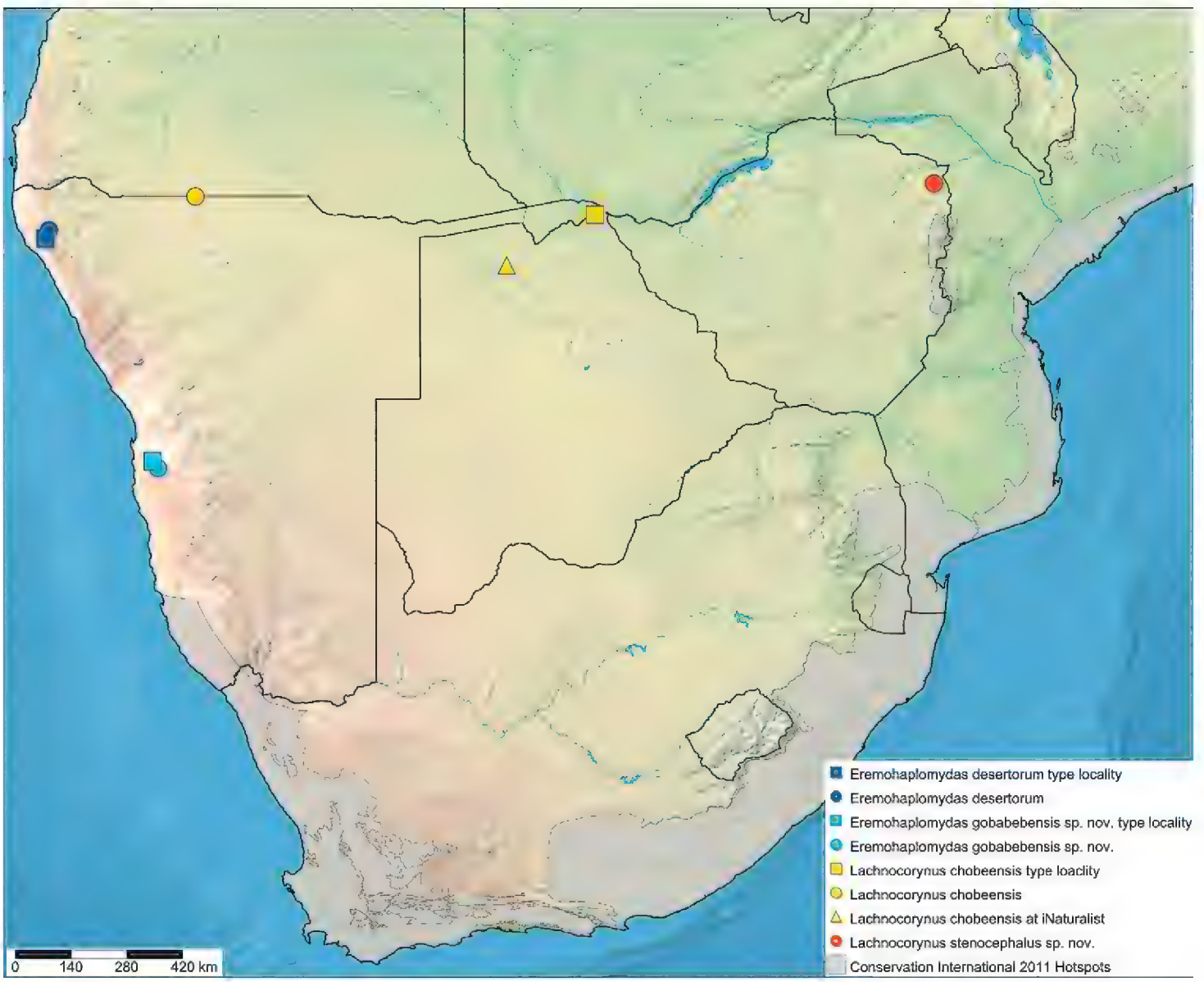


Figure 56. Map of southern Africa with elevational relief and biodiversity hotspots (*sensu* Conservation International in grey) and distribution of *Eremohaplomydas desertorum*, *Eremohaplomydas gobabebensis* sp. nov., *Lachnocorynus chobeensis*, and *Lachnocorynus stenocephalus* sp. nov. (SimpleMappr https://www.simplemappr.net/map/14089). Distribution and occurrence data available in Google Earth KML file https://www.simplemappr.net/map/14089.kml and also through GBIF (data-set https://www.gbif.org/dataset/993875DD-5915-4107-8707-835D5A8D1022, DOI https://doi.org/10.15468/awpjz9).

more pronounced expanded metathoracic femora, R_5 terminates into R_1 only, and the alula is greatly reduced to a small lobe. In this case, the two geographical areas exhibit each both morphological pairs: one large and robust species and one small and slender species.

Field-work in the Namib Desert might reveal the presence of *Eremohaplomydas* elsewhere and it will be interesting to learn whether such a pattern of sympatric distribution with different morphologies and seasonal imago flight activity will hold.

Morphological features

Metathoracic coxa and metakatepisternum

The development of the metathoracic coxa and the metakatepisternum in *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* is unique within Mydidae. In general, metathoracic coxae in Mydidae are barrel-shaped and sclerotized on all sides. They move in

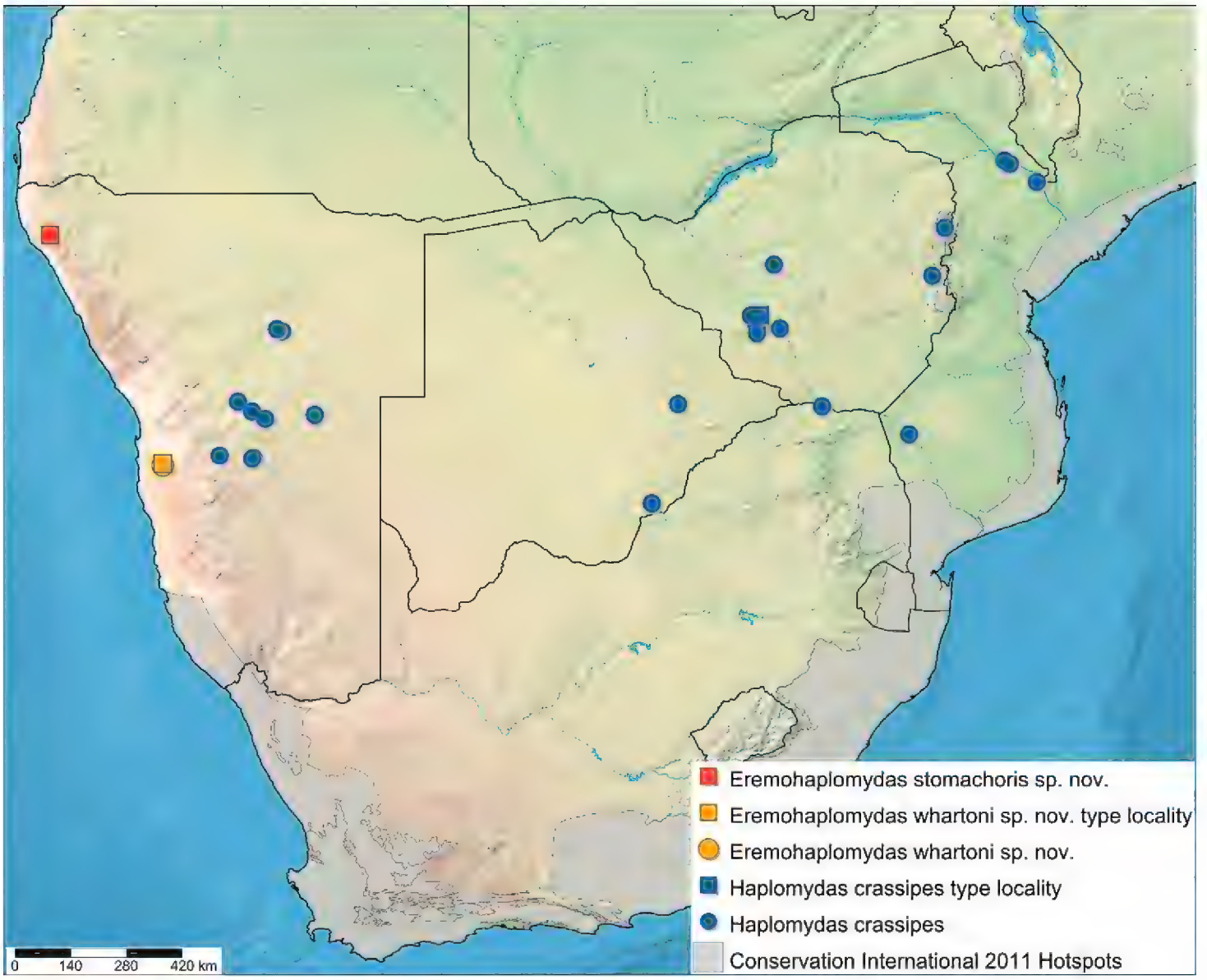

0 140 280 420 km
Eremohaplomydas stomachoris sp. nov.
Eremohaplomydas whartoni sp. nov. type locality
Eremohaplomydas whartoni sp. nov.
Haplomydas crassipes type locality
Haplomydas crassipes
Conservation International 2011 Hotspots

Figure 57. Map of southern Africa with elevational relief and biodiversity hotspots (*sensu* Conservation International in grey) and distribution of *Eremohaplomydas stomachoris* sp. nov., *Eremohaplomydas whartoni* sp. nov. (both localities only 5 km apart), and *Haplomydas crassipes* (SimpleMappr https://www.simplemappr.net/map/14090). Distribution and occurrence data available in Google Earth KML file https://www.simplemappr.net/map/14090.kml and also through GBIF (data-set https://www.gbif.org/dataset/993875DD-5915-4107-8707-835D5A8D1022, DOI https://doi.org/10.15468/awpjz9).

a plane from anterior to posterior (or if positioned more postero-ventrally in a plane from dorsal to ventral) through two articulations — one lateral and one median.

In lateral view, the metathoracic coxa of species of *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus* appears unsclerotized to a large extent (Figs 53–55) and is not cylindrical or barrel-shaped. The metakatepisternum is expanded laterally so that the median articulation point of the coxa is moved laterally. It is now positioned antero-ventrally and facing anteriorly (Fig. 54) so that it is visible in lateral view. It allows the coxa now to (potentially) move in a plane from median to lateral away from the thorax to position the legs out sideways. The only observation of a species of these genera in nature, *Lachnocorynus chobeensis* at iNaturalist (https://www.inaturalist.org/observations/26760859), illustrates this quite well. The unsclerotized and membranous area is formed by the membrane between the metakatepisternum and coxa and the coxa is itself less produced laterally.

More observations in nature are necessary to document the way the coxae and legs are being held in species of *Eremohaplomydas*, *Haplomydas*, and *Lachnocorynus*.

Wing venation of *Eremohaplomydas gobabebensis* sp. nov.

Eremohaplomydas gobabebensis sp. nov. is morphologically most similar to *E. stomachoris* sp. nov. (note that these species are only known from males and a single female, respectively). However, they differ distinctly in their wing venation. *E. gobabebensis* sp. nov. is unique among the species included here (and probably all Mydidae) in that the base of M_3+M_4 is absent (Fig. 10, view full-resolution file at Zenodo https://doi.org/10.5281/zenodo.6083969) and either the discal cell (d) is not developed or it is entirely fused to the basal medial cell (bm). The possibility exists that this unique arrangement of veins is a population-level anomaly. *Eremohaplomydas gobabebensis* sp. nov. has been collected at two different sites 21 km apart as the crow flies on consecutive days and most likely all collected specimens belong to the same population. The collection of additional specimens at different sites will provide evidence as to whether the peculiar wing venation is species-specific or only specific to the currently known population.

Clypeus development and minute proboscis in *Eremohaplomydas*

In Mydidae, the clypeus is developed as either an inverted U-shaped sclerite, an inverted U-shaped sclerite in which the dorsal half is sclerotized and forms a plate, or a single sclerite which is entirely sclerotized medially (Dikow 2009, p. 22). In *Haplomydas* and *Lachnocorynus* species the clypeus is formed by a single sclerotized plate, is recessed (concave), positioned posterior to the proboscis, and connected laterally to the face (or the facial swelling) by membranous cuticle. This specific arrangement is found in most Syllegomydinae but is considerably different in species of *Eremohaplomydas*. The most generalized and simple arrangement is found in *Eremohaplomydas gobabebensis* sp. nov. in which the clypeus is formed by an inverted U-shaped sclerite with the dorsal half sclerotized, is recessed (concave), is positioned posterior to the proboscis, but is connected laterally to the face (or the facial swelling) by sclerotized cuticle (Fig. 32). In *Eremohaplomydas stomachoris* sp. nov. the clypeus is formed by a single sclerotized plate, is flat to protruding (convex) ventrally, is positioned posterior to the proboscis, and is connected laterally to the face (or the facial swelling) by sclerotized cuticle (Fig. 33). The most bizarre arrangement is found in *Eremohaplomydas desertorum* and *Eremohaplomydas whartoni* sp. nov. in which the clypeus is formed by a single sclerotized plate, is protruding (convex) ventrally, is positioned anterior to the proboscis (almost covering the minute proboscis), and is connected laterally to the face (or the facial swelling) by sclerotized cuticle (Figs 31, 34). Not only is the proboscis minute in these two species, it is covered by the protruding clypeus, which might further reduce the potential for feeding on pollen or nectar. We believe this unique morphology of the clypeus (being anterior to the proboscis) is not caused by preservation as it is consistently found in the specimens studied and no other evidence would suggest that the clypeus was somehow transformed.

Wharton (1982) postulated that several Mydidae species do not feed as adults in the central Namib including *Eremohaplomydas whartoni* sp. nov., which he collected near Gobabeb (identified as *Eremohaplomydas* sp. in his Table 1). When *Eremohaplomydas gobabebensis* sp. nov. was collected in open sandy areas with sparse grass covering

(see Figs 1–2), no flowers were present in the immediate collecting area. While the absence of flowers in the area where a species was collected cannot be taken as evidence as to whether the species does or does not feed as imagines, it does provide additional data to evaluate the ability to feed. With the external mouthparts in form of the proboscis being minute and potentially non-functional, we can only support Wharton's hypothesis that species of *Eremohaplomydas* do not feed as adult flies. A comparative morphological study including CT scanning of several short-proboscis Mydidae species, which has been started by the junior author, will hopefully provide new data to further study this phenomenon.

Seasonal imago flight activity

Species of the three genera have been collected in the Southern Hemisphere late spring to winter (Table 2). *Eremohaplomydas* species are restricted in imago flight activity to either November in late spring (*Eremohaplomydas gobabebensis* sp. nov.) or late autumn (May) to early winter (June) (Table 2). Imagines of *Lachnocorynus* fly only in winter (June–August, Table 2) while the imago flight activity of *Haplomydas crassipes* is restricted to late summer (February) to late autumn (May, Table 2).

Biodiversity hotspots

Of the eight species included in this study, the only species that occurs within a currently recognized biodiversity hotspot *sensu* Conservation International is *Haplomydas crassipes*. Two collecting events of this species are within the Eastern Afromontane biodiversity hotspot in eastern-most Zimbabwe (Fig. 57).

Conclusion

With the description of four new species and the synonymy of one species, there are now 182 species of Mydidae in southern Africa and 483 species known in the world.

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